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Arable Crop Position

Guide to Farmers in War-time

A. T. SHANNON, Instructor in Agriculture, Wellington.

IN organising crop production under war conditions the first requirement is to provide for New Zealand consumption, and to do so it may be necessary to extend the production of some crops at the expense of others. It is therefore essential to consider what the surplus acreage above home requirements is in some crops, and what the deficient acreage amounts to in others.

As it is difficult to decide which season to regard as normal, a picture is presented in the accompanying diagrams to show the position for each of the past six seasons, and the average is computed from this.

The total production for each crop dealt with is shown shaded, and is included in heavy lines. The variation from season to season is due to the differences in acreages sown and yields per acre, and these are included in the diagrams showing total production. In order to show the apparent local consumption, exports (shown shaded with crossed lines) have been subtracted from the total production, or imports (shown blank) have been added.

Imports and exports are indicated separately at the top of each diagram, and it will be noticed that in some years there have been both imports and exports of the same crop, for example, onions, in which case a balance has been struck to show net imports or exports. By dividing the deficiency or surplus of production by the yield per acre in the same season, the deficient or surplus acreage is arrived at. The information relating to imports for 1939 is not complete in all cases, but may be taken as an approximation.

The diagrams should be of considerable value to the farmer, as any policy concerned with national crop production will be influenced mainly by the necessity of providing for New Zealand requirements and then by the desirability of expanding the export trade.

The intelligent use of these diagrams can assist the farmer in planning his cropping in anticipation of such a policy.

Wheat Crop Does Not Meet the Demand

THE total value of the wheat crop has varied from £1,400,000 in 1934-35 to £2,200,000 in 1935-36, the value of the crop in the 1937-38 season being £1,700,000. The acreage has shown an almost continuous decline since 1933-34, and the New Zealand production, which was 9,000,000 bushels then, has fallen to 5,500,000 bushels in 1938-39, while local consumption has now shown a corresponding decline.

The limiting factors in the total production of wheat are the yield and the acreage, and Hilgendorf gives the four chief reasons for variation in the yield as follows:—1. Superfluous soil moisture in winter. 2. Lack of moisture in summer. 3. Unstable soil texture. 4. Insufficient plant nutrients.

The result of irrigation on wheat production is not yet certain, but some doubts have been entertained as to its value in assisting wheat production.

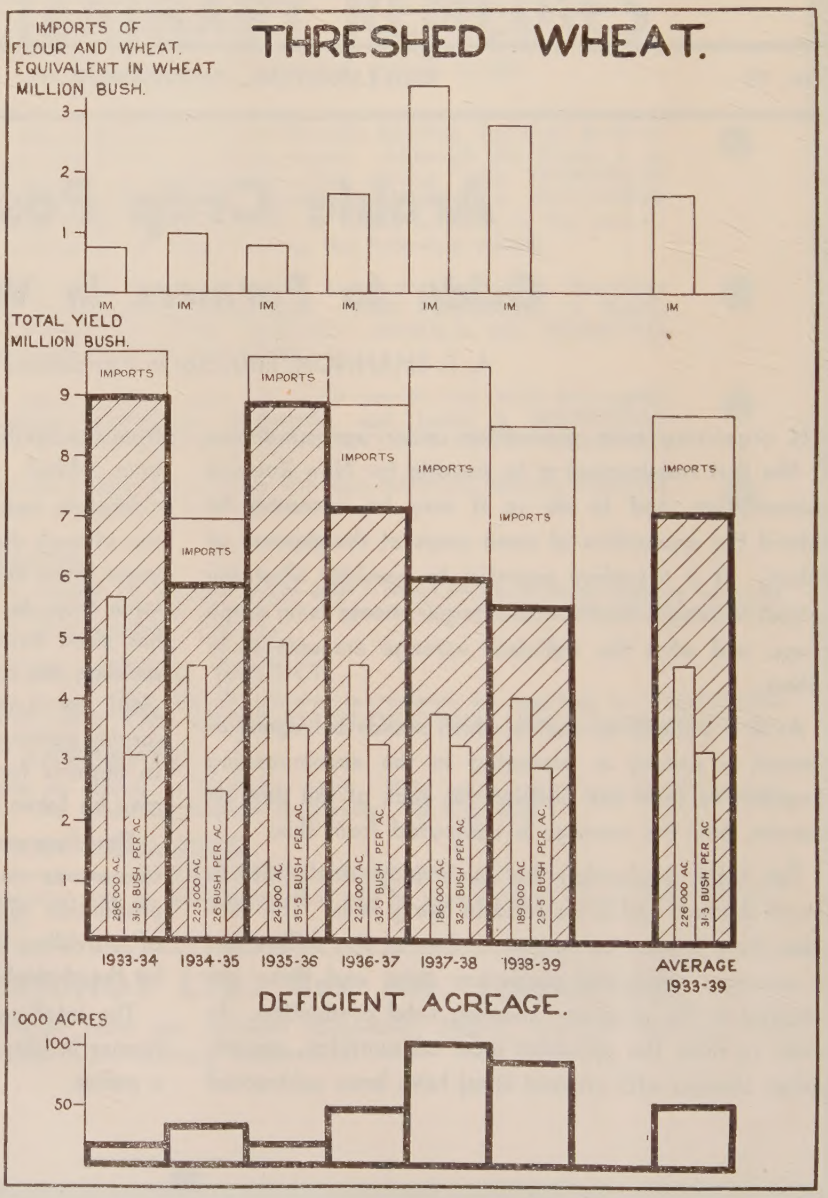
The new variety "Tainui" shows considerable promise as a spring-sown wheat by reason of its quick growth, early maturity, and heavy yield. Except that it is subject to frost damage and is somewhat weak in the straw, it should prove of great value.

It is estimated that it requires 1 cwt. of superphosphate per acre to replace the phosphate removed by a 40-bushel crop. South Island experiments show that the application of 1 cwt. superphosphate increases the yield by roughly 4 bushels per acre—a handsome proposition. More than 1 cwt. per acre does not increase the yield correspondingly.

Of the total production of wheat, between 1,000,000 and 2,000,000 bushels are used for stock feeding. It is worth noting that our imports of pollard are considerable, amounting to 174,000 centals, valued at £65,000, in 1937.

New Zealand is far from being self-supporting in wheat, and in 1938-39 a further 91,000 acres would have been required to provide the 2,750,000 bushels imported, while on the average of the six seasons there is a deficiency of 55,000 acres. Of the New Zealand total of 189,000 acres of wheat threshed in 1938-39, Canterbury provided approximately 160,000 acres.

For the 1939-40 season it is estimated on farmers' returns that the wheat acreage will be 259,000 acres, an increase of 34 per cent. over the previous season. Given an average yield of 31 bushels per acre and the average consumption of wheat over the past six years, there will be a deficiency of about 700,000 bushels. It would require another 22,000 acres to provide this.



Production of Oats is Satisfactory

THE value of the oat crop has varied from £246,000 in 1934-35 to approximately £500,000 in 1937-38. The export of threshed oats is negligible, and the position of oat production is satisfactory, although it is considered that further encouragement should be given to the production of Duns and Algerians, particularly to supply seed oats to the North Island.

Actually, of the total oat crop, only 5 per cent. is grown in the North Island, and this is utilised mainly for chaff and green feed. Just over half the crop is located in Canterbury, and about one-fifth in Otago.

Varieties Sown

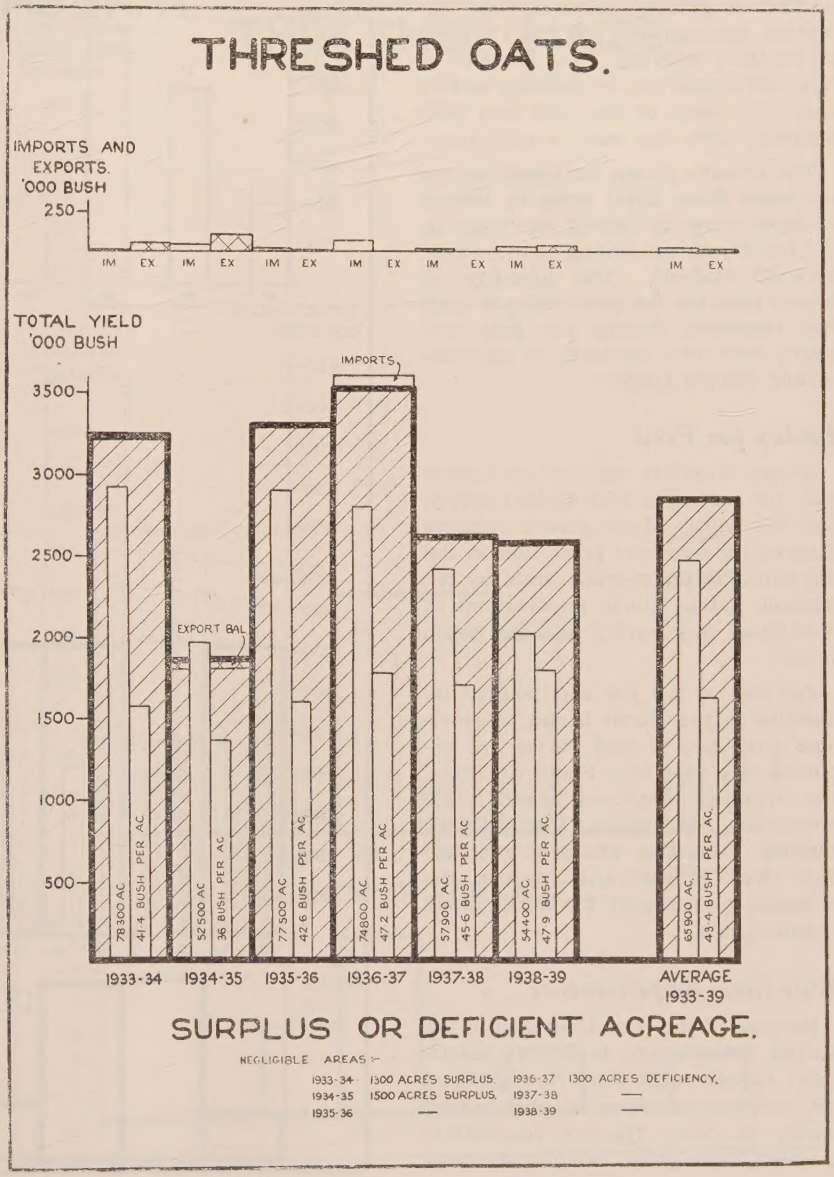
About 80 per cent. of the North Island crop is Algerians, largely because of its rust-resistant qualities. The South Island prefers Gartons, while Otago grows almost wholly Gartons for threshing. In 1938-39, of 280,000 acres of oats sown, 19 per cent. was threshed, 63 per cent. made into hay, chaff, and silage, and 18 per cent. fed off. The estimated acreage for 1939-40, amounting to 254,000 acres, shows a decline of 26,000 acres, or 9 per cent.

The quantity of oats used for milling purposes averages about 650,000 bushels, which is about one-quarter of the total quantity threshed. As a result, there is in most years a surplus of this grain to be carried over, and the price is usually low compared with that of wheat or malting barley.

Tariff on Imports

Producers of oats in New Zealand are protected by a tariff of 1s 6d per cental levied on imported oats. In addition, permits to import are now granted only for Algerian oats required for green feed production in the North Island, and only to the extent that Canterbury farmers are unable to supply the full requirements.

A large proportion of the oat crop is held on farms as a reserve feed supply for sheep, and may be carried over in stack if the price for this grain or for chaff is considered too low. The trade in chaff nowadays amounts to only a small fraction of its former dimensions.



Barley for Malting and Feed

BARLEY is grown in New Zealand for sale as malting barley, for green feed production, and also for sale as pig and poultry feed. The quantity grown for malting purposes accounts for the bulk of the acreage.

For a number of years before 1937 it was necessary to import considerable quantities of malting barley, but since the establishment of a minimum price schedule, coupled with the introduction of grading standards and the further development of the system of contract growing, New Zealand is now self-supporting in malting barley, and from each of the 1938 and 1939 harvests there has been a carry-over.

The acreage grown for threshing has increased from 18,441 acres in 1934-35 to 26,900 acres in 1938-39, the yield in the latter year amounting to more than 1,000,000 bushels. The quantity of barley used for the production of malt has increased during the past few years, and now amounts to approximately 800,000 bushels.

Barley for Feed

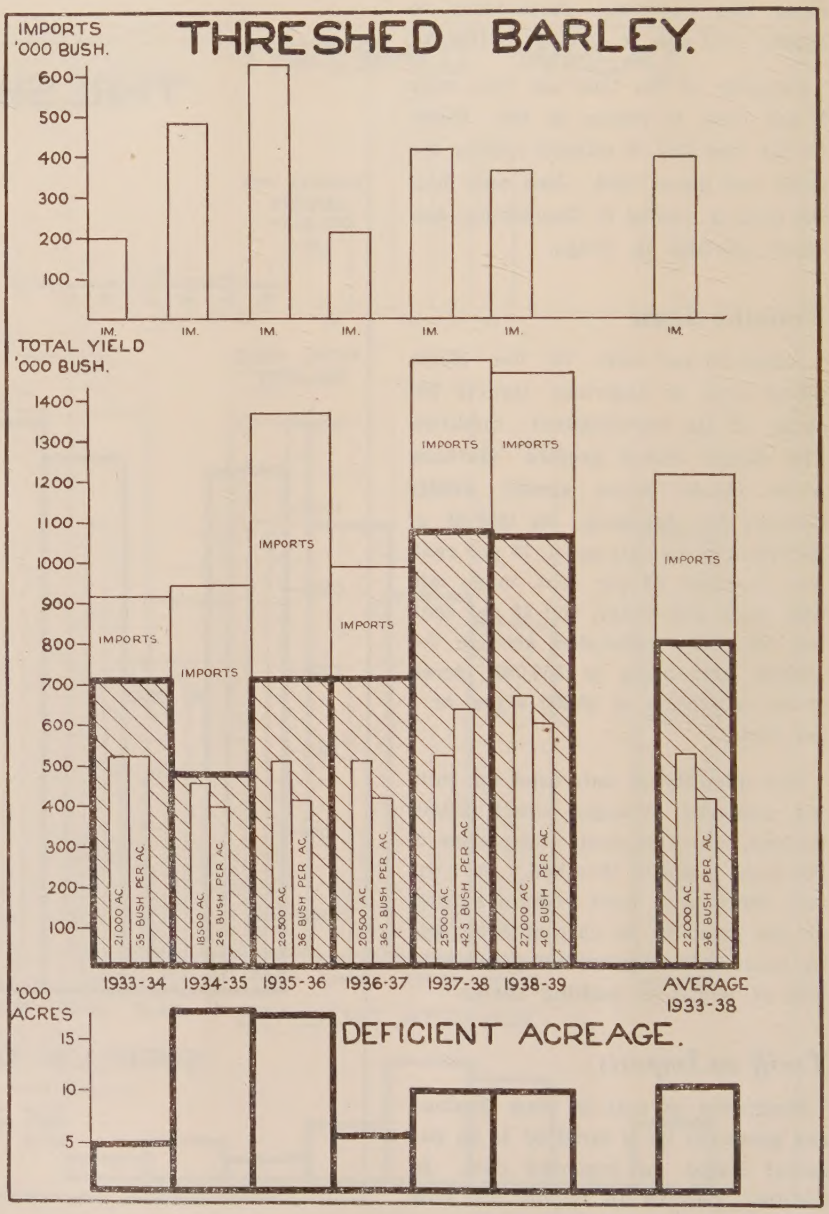
Barley which is rejected as unsuitable for malting is sold as feed barley, and the South Island grower receives a certain measure of protection in the marketing of under-grade grain by the decision not to allow importations of Australian feed barley into the South Island.

For use in the pig and poultry industries in the North Island considerable quantities of feed barley are imported each year from South Australia, the quantity imported during 1939 amounting to more than 400,000 bushels. As this grain is admitted duty free, it generally proves the cheapest grain supply for North Island requirements.

War-time Requirements

Because of the recent decision of the British Government to import principally baconer pigs from New Zealand the provision of cheap supplies of feed barley or other type of concentrate feed has to be given careful consideration. In most of the dairying districts it is not practicable to extend the acreage in grain crops and the cost of transport from the grain-growing districts of the South Island to the pig-raising districts of the North Island makes the delivered cost of feed grains prohibitive if the producer in the South Island is to receive a price even approximating to cost of production.

It therefore appears that it will be necessary for the North Island pig industry to rely principally on supplies of barley or pollard imported from Australia.



Production of Maize

MAIZE for threshing is grown chiefly in the Poverty Bay and Bay of Plenty districts, with smaller acreages in North Auckland and Hawke's Bay. The total area averages approximately 7,000 acres, and the yield recorded is about 350,000 bushels. A scheme of minimum price fixation has been adopted, and the price for the 1939 crop has been on the basis of 5s 6d f.o.b.s.i. Gisborne.

One of the difficulties in the marketing of maize is the cost of transport from the districts which produce a surplus to the consuming centres. For example, the cost from f.o.b. Gisborne to ex-wharf Auckland or Wellington is approximately 1s per bushel. As a result, this grain has been considered too expensive for use in pig production, and its sale has been, practically speaking, confined to the poultry industry.

Imports Necessary

Importations of maize are necessary in most seasons to supply the market during the late autumn and winter months, as local crops are not usually mature enough for shelling before July. The average quantity imported during the past six years has been 90,000 bushels, but in one of those years a total of 250,000 bushels was imported.

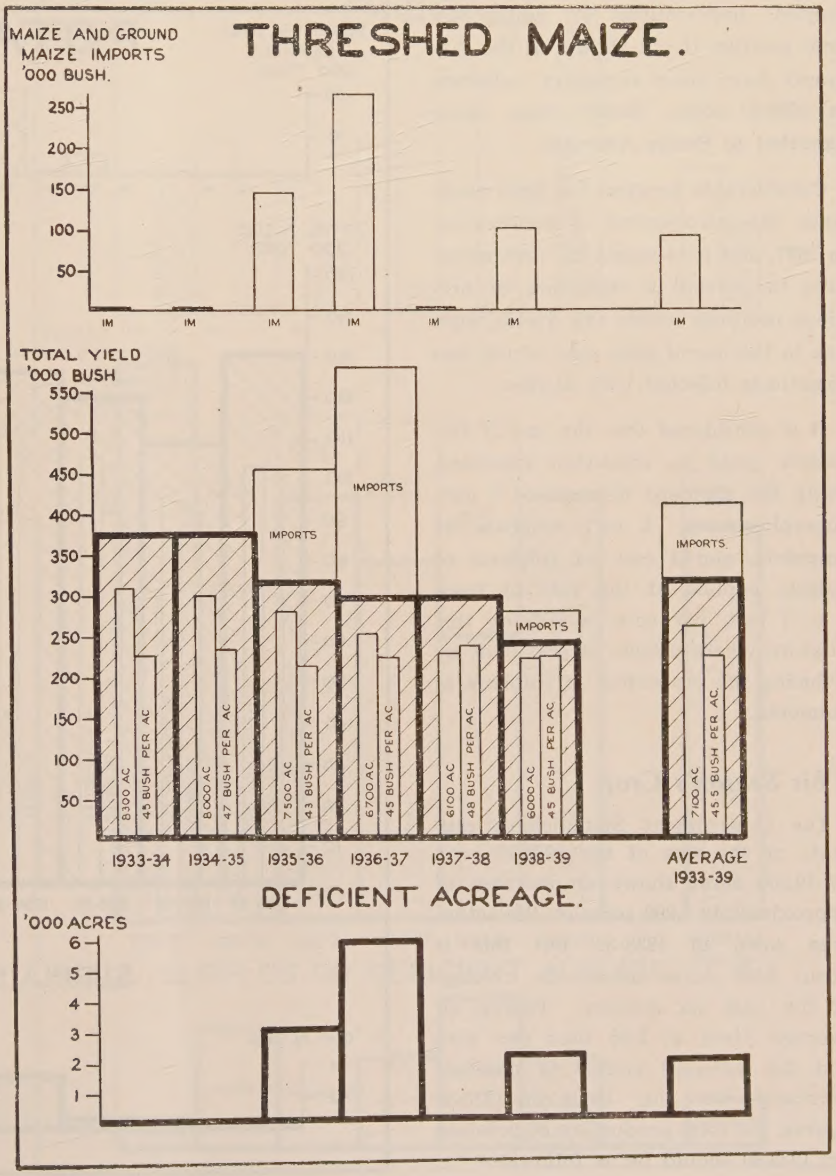
Local maize growers are protected by a duty of 1s 6d per cental on maize imported from British countries, and 2s per cental on maize from foreign countries.

The extension of maize growing to supply New Zealand requirements fully has been suggested, but it is felt unwise to encourage the breaking-up of first-class permanent pasture in the maize-growing districts on any large scale.

Experimental Work

The Department has experimental work in progress with a view to testing out the possibilities of growing early-maturing types of maize in other districts, and it is possible that maize may be ripened quite successfully in such areas as the Central Waikato.

In addition to the area sown in maize for threshing, approximately 7,000 acres are grown each year for feeding-off green or for ensilage. For this purpose it is usual to sow one of the white-seeded varieties, and it is frequently necessary to import seed of this variety from Australia.



Variations of Potato Yield

THE value of the potato crop has fluctuated between £400,000 in 1932-33 and £700,000 in 1934-35. In 1937-38 the value was estimated at about £500,000.

On the average, nearly 23,000 acres of potatoes are grown annually, and, depending on the season and consequent yield, gluts and shortages occur. This year has been unique in that limited importations (of which the final position is not shown on the diagram) have been necessary, whereas in 1936-37 some 22,000 tons were exported to South America.

Considerable progress has been made since the introduction of certification in 1927, and it is hoped by such measures to prevent a repetition of previous positions where low yields were due to the use of poor seed which was sometimes infected with disease.

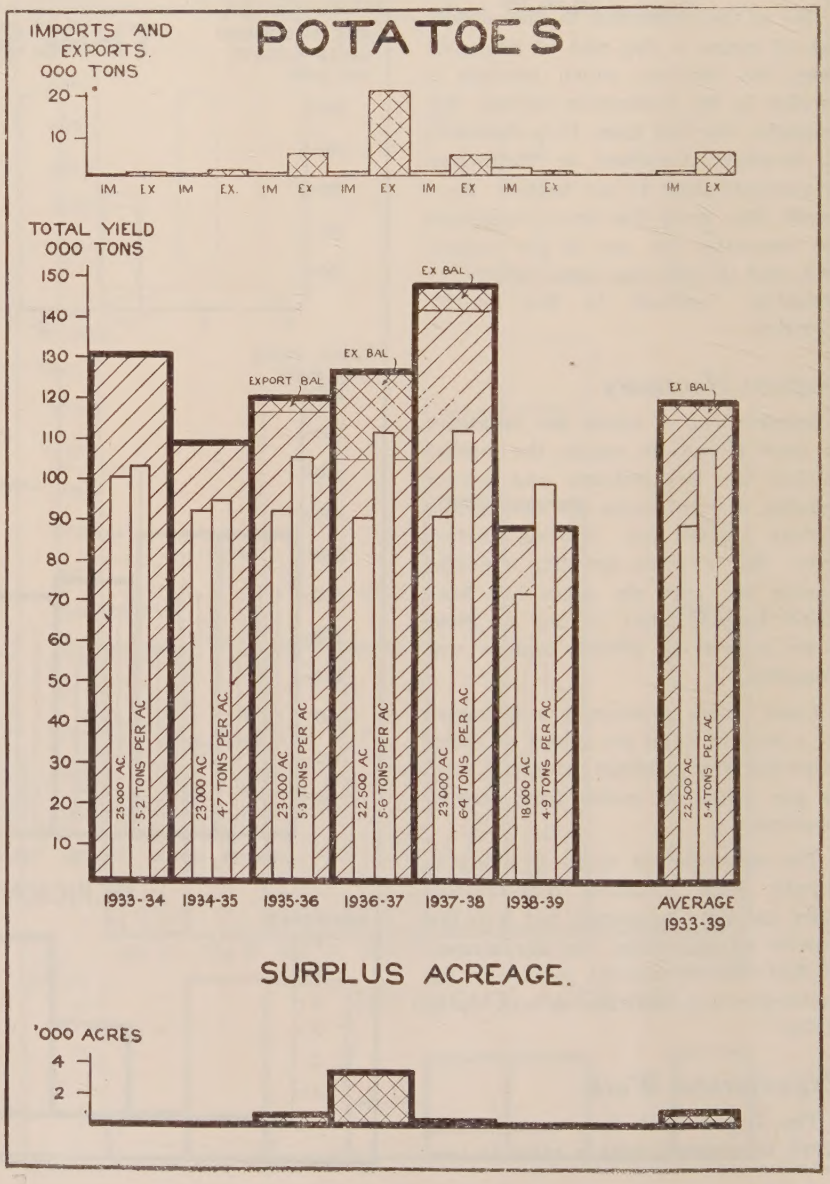
It is considered that the use of fertilisers could be somewhat extended, using the standard mixture of 3 cwt. superphosphate, 1 cwt. sulphate of ammonia, and 1 cwt. of sulphate of potash, applied at the rate of from 5 to 7 cwt. per acre, modifying this mixture where disease is prevalent by reducing the proportion of sulphate of ammonia.

This Season's Crop

The Government Statistician's estimate of the size of the 1939-40 crop at 19,800 acres shows an increase of approximately 1,800 acres on the actual area sown in 1938-39, but this is about 2,500 acres below the average of the past six seasons. Taking an average yield at 5.35 tons per acre and the different classes of potatoes produced on the basis of 1938-39 figures, the total production of potatoes for 1939-40 should be as follows:—

Table potatoes	.....	72,000 tons
Seed potatoes	.....	25,000 tons
Pig potatoes .	.....	9,000 tons

It is worth nothing that in 1938-39 Aucklander Short Top and Dakotas each provided about one-quarter of the total crop, with Arran Chief next at one-tenth, other varieties being of minor importance.



Onions Exported and Imported

THE value of the onion crop fluctuates around £50,000. Of a total of 618 acres grown in 1937-38, 355 acres were in Canterbury and 185 acres in North Auckland. Because of the fact that varieties grown locally will not keep for a sufficiently long period, New Zealand is obliged to import onions to supply the market from August or September until December. Growers are being encouraged to sow longer-keeping varieties, and the position is becoming more satisfactory each year.

Difficulties have arisen because of the particular requirements of onion production. Strong flavoured varieties, such as Brown Spanish, are definitely not popular, and the persistence of mildew among crops of this variety has been most disconcerting to growers. Thin-skinned varieties are undesirable because they are easily damaged, while thick-skinned varieties dry slowly and there is a greater wastage in storage.

The Department of Agriculture has devoted considerable effort to encourage the growing of suitable varieties, and the position now is reasonably satisfactory, although there is still scope for improvement.

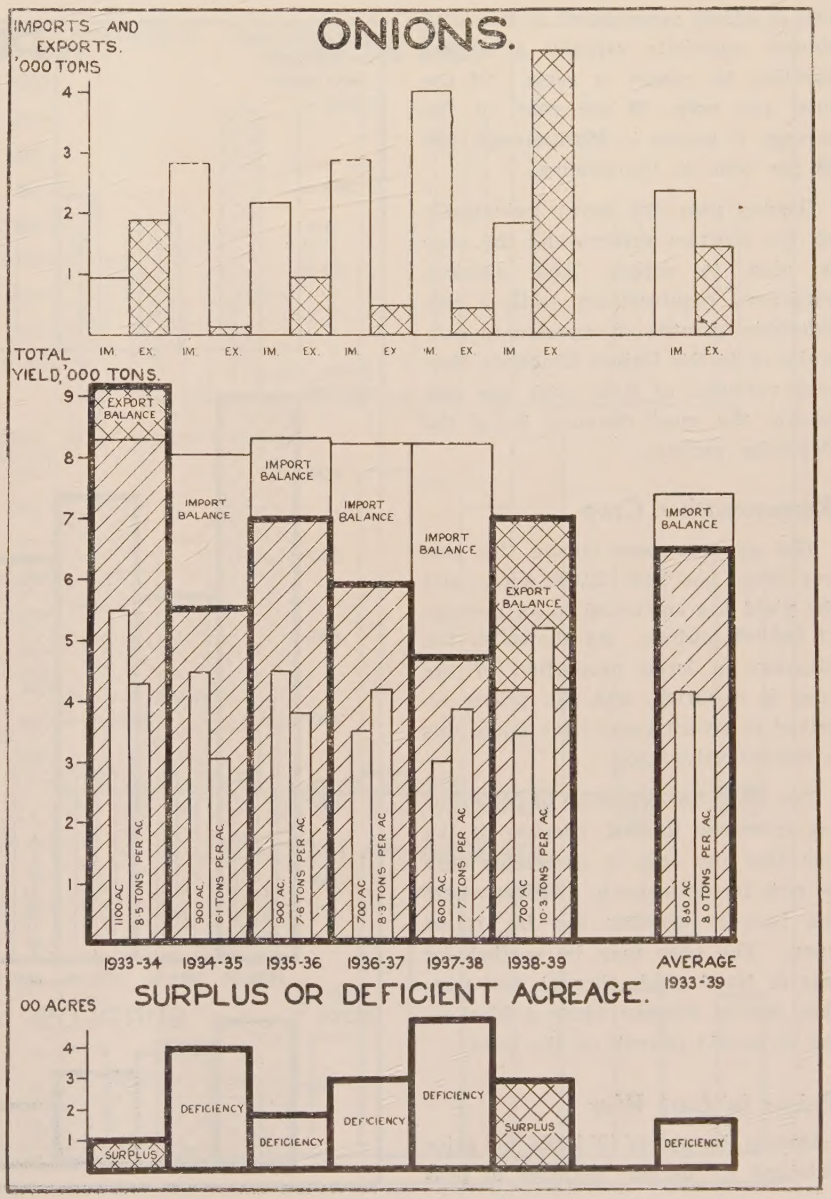
Danger of Gluts

Normally, about 800 acres are grown, and within limits it is not desirable to increase this acreage materially, otherwise gluts will occur. Importations of onions for the current year have not ceased, and it is probable that the export balance, as shown, will be reduced somewhat and local consumption thus increased. The local consumption of onions varies from year to year, largely as a result of price fluctuations.

Onions are exported to Canada or Australia during the months January/May, the quantity shipped during 1939 amounting to 5,000 tons valued at approximately £74,000 f.o.b. This figure represents a substantial increase on the normal export value, and is due almost entirely to the fact that the Victorian crops were a partial failure.

Marketing

The marketing of onions is regulated by an Advisory Committee representing growers and merchants, and this Committee is responsible for the fixation of minimum prices, the establishment of grading regulations for both local and export markets, and the restriction of imports.



Peas Available for Export

THE pea crop is an important one, particularly in Marlborough and Canterbury, and successful crops are also grown in Hawke's Bay, where it has been the practice of some farmers to sow peas after ploughing up a run-out pasture and before resowing it for seed production.

The value of this crop in the rotation is widely appreciated, as it is considered especially valuable as a preparation for wheat or grass. Of the total pea crop, 25 per cent. of the acreage is grown in Marlborough and 65 per cent. in Canterbury.

Garden peas are grown principally on the contract system, and the crop is used to supply local market-gardeners' requirements, while a considerable quantity is exported to Australia or to the United Kingdom. Several varieties of field peas are also grown, the most common being the Partridge variety.

Remunerative Crop

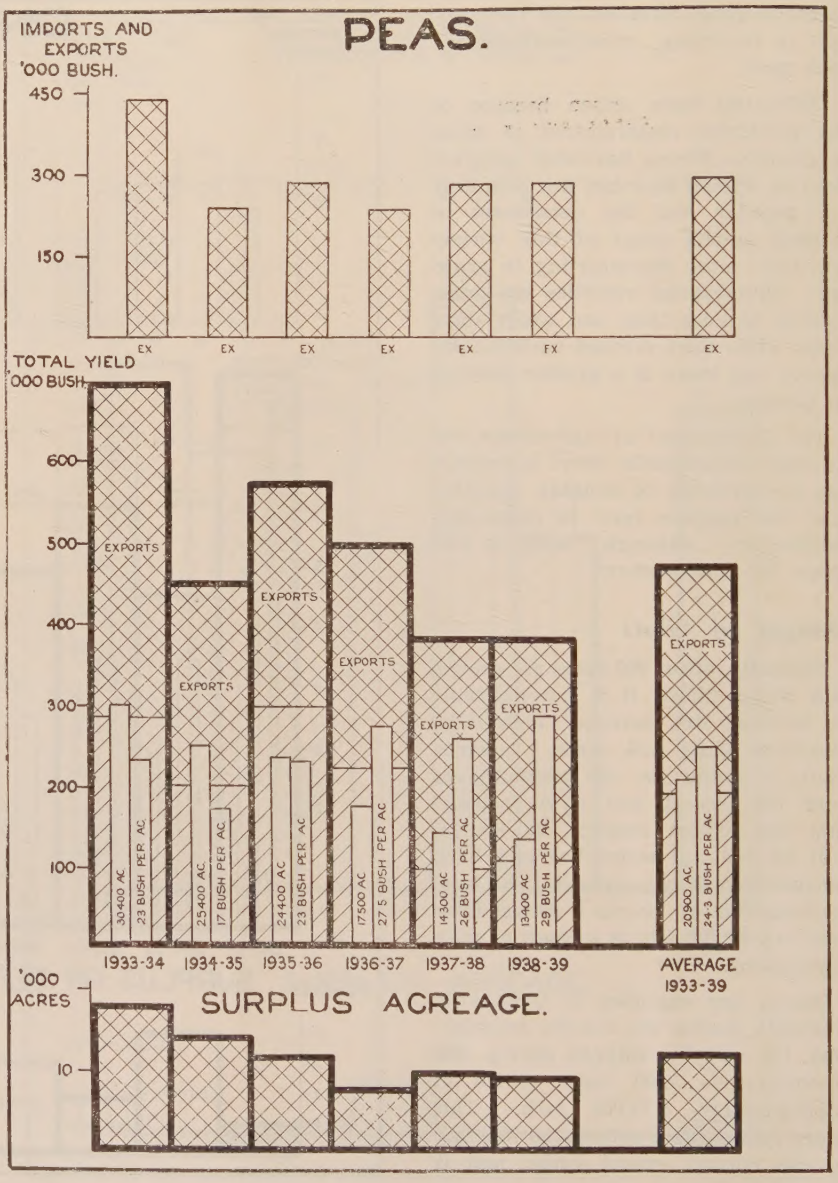
The average area during the past five years has been 22,000 acres, and the yield has amounted to an average of 500,000 bushels. As shown in the diagram, a large proportion of the crop is exported, and the prices received in recent years have made this a remunerative crop.

The scope for expansion of pea-growing is rather limited, because of the fact that the crop is successful only on rich, fertile loams in districts where the harvest weather can be relied upon. The crop may be spoiled for sale as No. 1 grade through wet weather during harvest causing blackening or mould growth on the peas.

Prices in Last War

During the war of 1914-1918 the price obtained for certain varieties of peas was extremely high because of the fact that the countries in Central Europe normally supplying Britain with the largest proportion of her requirements were blockaded, and if similar conditions obtain during the present war it is possible that a marked expansion of the area devoted to peas will be found necessary.

Peas that are not equal to export grades prove extremely valuable as stock food, especially for pigs intended as baconers.



Linseed Crop Fluctuates

THE position of the linseed crop has been given over the past eleven years because of the wide fluctuations in both local production and imports. The value of the linseed crop varied from £60,000 in 1929-30 to £2,000 in 1932-33, the value in 1937-38 being £7,000. Before the Auckland linseed crushing plant closed in 1932, farmers were assured of a reasonable price for their crop. Since then export prices have proved unattractive.

So far, linseed growing in New Zealand has been confined to short-stemmed varieties having a high seed-yield and a high oil-content. More attention has recently been given to the possibility of developing other varieties suitable for fibre production, as it is considered that the United Kingdom would prove a profitable market, especially in view of the demands for linen products by the Army, Navy, and Air Force.

Unfounded Reputation

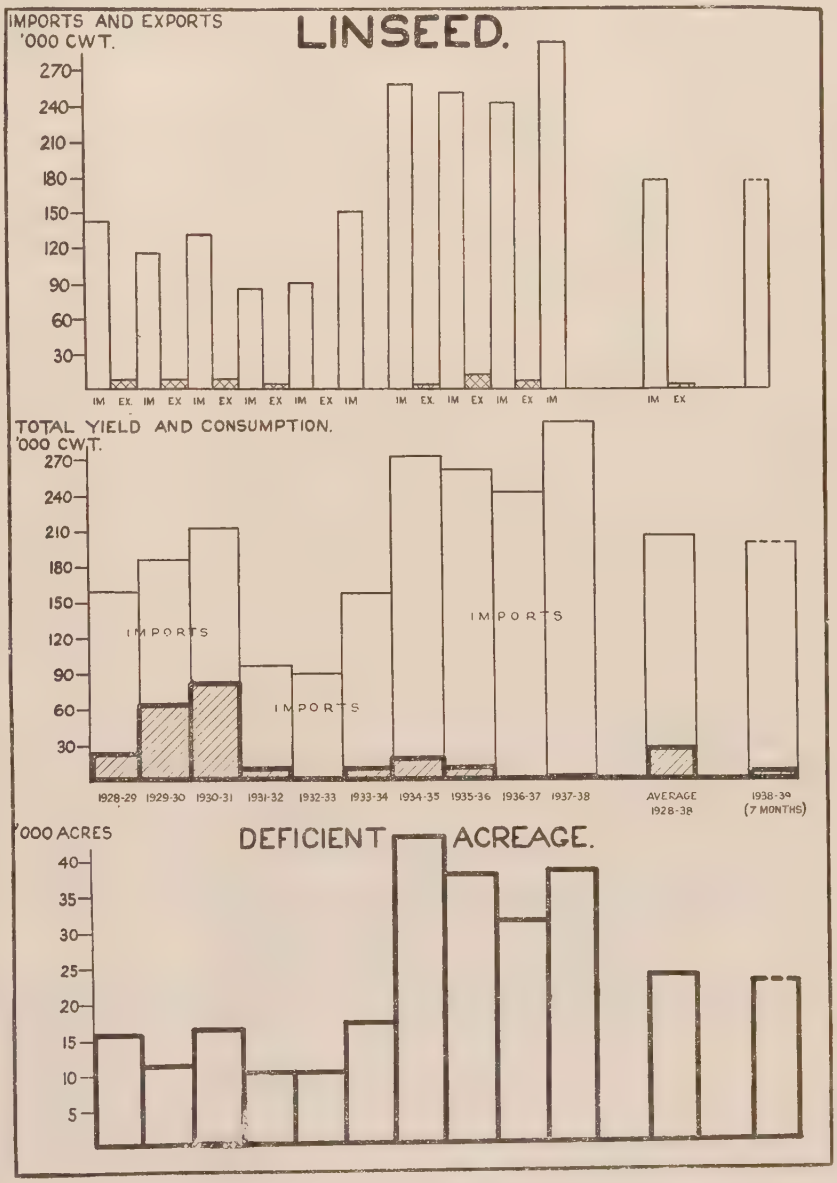
The crop is practically confined to the clay loams of Canterbury. Unfortunately, linseed has acquired a reputation for exhausting the soil, but this is not now considered correct when proper use is made of fertilisers.

The bulk of linseed imports are in the form of linseed oil, which for the purpose of the diagram, has been converted into its equivalent in linseed. In the average of the ten seasons from 1928-29 the area of linseed grown has been 3,200 acres, yielding 25,000 cwt., but this average does not give a representative picture of the position, as the area sown has been as high as 12,000 acres in 1930-31, when the linseed crushing factory was operating, and as low as 300 acres in 1932-33.

Heavy Importations

In 1938-39 the area sown was 1,800 acres. This acreage provides a negligible proportion of the total requirements, and the deficiency in terms of acres of linseed has been round about 40,000 acres in the four seasons from 1934-35. The import figures for seven months of the present year indicate that the deficiency is at least as great for the 1938-39 season.

In view of the prospective difficulties of importation of oil there is considered to be a strong case for fostering the growing of our requirements within the Dominion, specially as the by-products of linseed-oil production are of considerable value as stock feed



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Farm Production in War-time

Interim Programme for Increasing Dominion's Exports

R. P. CONNELL, Organiser of Farm Production, Wellington.

THE programme of farm production which, after consideration by the National Council of Primary Production, is now recommended to farmers, should be put into operation to the greatest extent practicable. This programme is an interim one. Alterations in our circumstances, which it is imposisble to forecast, may call for its revision, but if we do not have to face a change in circumstances, the programme may be expected to stand as sound.

(1) The Use of All Available Supplies of Phosphatic Fertilisers.

This calls for but little comment. The value of fertilisers for arable crops is well established, and it is estimated that there are at least 7,000,000 acres of grassland utilised for fat-lamb production and dairying which may be expected, as a rule, to respond profitably to phosphatic topdressing.

In addition, there is a fairly substantial area not devoted to dairying or fat-lamb production on which phosphatic topdressing is known to increase the yield of pastures to a profitable extent. We have been topdressing approximately 3,300,000 acres annually.

(2) The Local Production of an Increased Supply of Better Pasture Seed.

The need for this exists even if the war-time farming programme does not lead to an increased acreage under the plough. The programme should, and probably will, lead to increased ploughing. The main species calling for attention are perennial ryegrass, cocksfoot, white clover, and red clover.

The perennial ryegrass position is generally considered to be the most satisfactory, but actually it is weak, as may be seen from the following facts:—

About 600,000 acres are being sown down to grass each year.

Of this, 100,000 acres is the estimated acreage of temporary pasture sown annually.

An interim programme of farm production to meet war-time conditions is outlined in this article. The recommendations are economically sound for both normal and abnormal circumstances, and point the way to increases in production in our chief farm products.

There remains 500,000 to be sown in permanent pasture.

Approximately 170,000 bushels of certified seed or its equivalent is used locally each year.

This means that on the bulk of the area annually sown to permanent pasture perennial ryegrass of poor or uncertain type is used. An increased use of the plough will intensify this weak position.

In short, while our total production of seed of the more important pasture species has been quite sufficient to meet our needs, our production of seed which is known to be of good type is quite inadequate, and a war-time programme involving an expansion in the area ploughed can be looked upon as completely sound only if it is associated with the provision of adequate supplies of seeds of good type or strain at the time resowing to permanent pasture is to take place.

(3) The Increased Local Production of Seeds of Arable Crops, such as Mangels, Carrots, Turnips, Rape, etc., and of a Range of the Main Vegetables.

In the past a substantial amount of this seed has come from the Continent of Europe, some directly and some as re-exports by Britain. The aim should be to make ourselves independent of such imports because of the prospective lack or uncertainty of overseas supplies.

It is of importance that, in general, the earliest possible action by New Zealand will not relieve the position until the 1941 harvest of seed comes into use. It may be advisable to grow seeds for export as well as to meet our own requirements. The position is being fully investigated, and already arrangements have been made to meet some of our most urgent needs by local production.

(4) Increased Production of Dairy Forages and Feed, including Those Advisable for Baconer Production.

There are two main lines of approach:—

(a) Increased haymaking and ensilage.

(b) Increased acreage of arable crops, including home-grown sup-

Every Sheep Farmer Should Have . . .

"The Proceedings of the Annual Meeting of Sheep Farmers, 1939"

(Being the Lectures given, and the Discussions thereon, at the Annual Meeting of Sheep Farmers held at Massey Agricultural College, June, 1939.)

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plies of barley, peas, maize, and roots for pig-keeping.

In typical dairying districts under normal conditions, when pasture management is reasonably efficient, about 40 per cent. of the total area of an all-grass farm annually becomes available for hay or silage production. The area harvested for hay or silage is only a small fraction of that which becomes available, so that the scope for expansion in the conservation of surplus pasture-growth is very substantial.

The greater the exploitation of hay and silage potentialities the less becomes the need for arable cropping on dairy farms, but quite often such crops are useful and profitable, especially when pig-keeping is made the feature of the farm operations that it is fitted to become.

Adequate provision of reserves of feed for the use of dairy herds may be expected to have the following results:—Better herd-averages, less disease and mortality in stock, and the production of better young stock for replacement purposes.

(5) Increased Provision of Sheep Forages.

Although the need for increased provision of reserves of feed probably is not so acute in sheep farming as in dairying, nevertheless it is known that an expansion of special feed production in sheep farming quite often would be profitable. The objectives of such production are:—

(a) "Flushing" of ewes where no provision for this is now made.—There is evidence that flushing is often associated with such an increase in the number of lambs born as to make it profitable. In a major sheep farming area an average increase of 8 per cent. in the lambing percentage was found where flushing takes place in comparison with the results under similar conditions except that the ewes were not flushed.

(b) Better feeding of breeding ewes in winter and early spring as a means to both lessened mortality in the ewes, especially at or about lambing, and smaller losses of lambs between birth and tailing.

In a main sheep farming province of a mild climate in the North Island a recent investigation has indicated an average loss of 9 per cent. of lambs between lambing and docking. It is considered that among the main causes of this loss are:—

(1) Weak lambs due to the poor condition of their dams.

(2) "Mismothering" arising from the ewes having a scant supply of milk due to their inadequate feeding.

If a 5 per cent. increase in the average lambing percentage could be brought about by lessening ewe-mortality, by increasing through flushing

In the personnel of the National Council of Primary Production given in the "Journal" last month the name of Mr. L. Maclean, chairman of the Electoral Committee of the New Zealand Meat Producers' Board, and a member of the Council of the New Zealand Sheep-owners' Federation, was inadvertently omitted.

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the number of lambs actually born, and by lessening the loss of lambs between birth and docking, the net result would be an increase of 1,000,000 in the number of lambs produced without increasing the number of breeding ewes.

(c) In planning their production of forage crops during the war sheep farmers should face the fact that the war begets uncertainty in shipping programmes, and that any serious upsetting of shipping arrangements may quickly lead to meat-works not being able to handle fat stock just when they become available. Hence, as a common-sense precaution there arises the need of special feed provision in addition to that which ordinarily is advisable, the objective being to avoid a general dislocation of the stock-feeding programme as a result of having to hold fat stock beyond the date expected and to obviate fat stock deteriorating to a store condition.

(6) Elimination of Leakages in Production.

Important causes of leakages in farm production are diseases of crops, insect pests of crops, diseases of stock, weed-invasion, and the ravages of rabbits. The points of prime practical importance are that there is a substantial body of knowledge on the economic means of minimising such leakages, and that these means are often overlooked when it would be quite practicable to employ them. In crop-protection alone much could be achieved by the universal application of knowledge which has become available during recent years in regard to fungicides, insecticides, disease-resistant crops, and deficiency disorders in crops. It may be said with certainty that full advantage is not being taken of our knowledge relative to the control of diseases in farm stock, while there is ample scope for the more effective handling of the problems of rabbits and weeds.

As full use as is desirable is not made of the information available at a nominal cost to individual farmers from the Meteorological Office. Such information is particularly valuable in respect of such matters as shearing and haymaking.

Sound Programme

The programme of farm production as outlined is economically sound in that it provides for courses of action which quite well could be followed in normal circumstances.

A vital feature of the programme is that the proposals for arable cropping require to be associated with sound grass-farming work, the essentials in which are the use of good strains of pasture species in the resowing of the land and the adequate use of fertilisers on the grassland.

If the programme is carried out it will leave our farming in a better position for production than it was ever before. The expansion in arable work which it involves should lead not to a depletion of land but to the replacement of present inferior pastures by superior ones.

Each June there is held at Massey College, Palmerston North, a meeting of sheep farmers at which lectures on subjects of vital interest are given by members of the staffs of the college and various Government departments and by farmers and others. These lectures, together with discussions, are published in booklet form by the college and, as advertised elsewhere in this issue, are now available from the college at a cost of 3/6 (including postage).

North Island Lambing Estimate

Contributed by the LIVESTOCK DIVISION.

From information supplied by the various Inspectors of Stock, the average rate of lambing for the current season in the North Island is estimated at 84.40 per cent., compared with 80.11 per cent. in 1938.

With 10,889,802 breeding ewes in the North Island, as shown in the 1939 sheep returns, the number of lambs this season is estimated at 9,190,994.

South Island and Dominion returns will be given in next month's issue of the "Journal."

Following is the estimated percentage of lambing, North Island, for the year 1939, and a statement for the previous five years showing also the actual number of lambs tailed:—

District.	Breeding Ewes.	Estimated Percentage of Lambs.	Estimated Number of Lambs.
Auckland	2,408,929	82.84	1,995,501
Gisborne-Hawke's Bay	4,246,346	84.02	3,567,804
Wellington	4,234,527	85.66	3,627,489
North Island Totals ..	10,889,802	84.40	9,190,994

Year.	Number of Breeding Ewes.	Estimated Average Lambing Percentage.	Estimated Number of Lambs.	Actual Number of Lambs Tailed.
1939	10,889,802	84.40	9,190,994	——
1938	10,735,829	80.11	8,600,625	9,068,741
1937	10,570,388	86.52	9,145,849	9,401,496
1936	10,300,826	90.50	9,322,476	9,423,240
1935	9,697,231	83.68	8,114,361	8,500,075
1934	9,524,065	88.70	8,447,643	8,555,477

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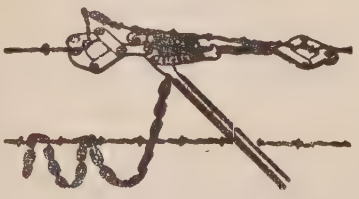

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Seed Certification Scheme

Alterations Necessary for 1939-40 Season

J. H. CLARIDGE, Seed Certification Officer, Fields Division.

BEGINNING with the 1939-40 season, it has been found necessary to introduce certain modifications in the scheme of seed certification. For the information of those interested the alterations to be made are set out below.

(1) The certification of *phalaris tuberosa* and of seed oats will be discontinued entirely in the meantime.

(2) The certification of seed wheat will in the meantime be discontinued except for certain areas enumerated below, the certification of which will be undertaken along the usual lines:--

(a) The areas of the Wheat Research Institute and of the Agronomy Division of the Plant Research Bureau sown with new varieties or re-selections of established varieties.

(b) The areas sown with seed produced from those areas described in (a) above.

(c) All areas of certain varieties, the rapid extension of which it is desirable to encourage, namely, Marquis, Tainui, Taiaroa.

(3) The scheme of certification covering perennial ryegrass has been subject to considerable amendment. Emphasis is being directed towards the value of the pedigree strain of perennial ryegrass which has been developed in the last few years. At the same time an endeavour is being made to extend the scope of that class comprising the main bulk of certified seed.

The following indicates the classes of seed which will be recognised in the future, and the seed eligible in each class:—

(1) "Government Stock."—Seed produced under contract by the Department from specially selected material.

(2) "Pedigree."—Seed produced from areas sown down with Government stock seed.

(3) "Mother."—Seed produced from areas sown down with pedigree seed.

(4) "Permanent Pasture."—Seed produced from all other sources which reaches the standard required for certification purposes. Certification in this class will be on the same basis as previously employed for the "commercial" class. This latter class now becomes absorbed in the permanent pasture class.

Farmers, merchants, and others requiring further information in regard to seed certification should communicate with the Instructor in Agriculture for their district.

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The Making of Ensilage

Importance of Using Young Leafy Material

J. M. SMITH, Fields Superintendent, Hamilton.

GREAT progress has been made in recent years with pasture farming, and with the advent of top-dressing, the use of better pasture strains and species, and the general betterment of pasture management, many farmers now find themselves in a position to maintain—and, in some cases, to improve—the economic production on their farms on grassland alone without having recourse to supplementary fodder cropping. This has been made possible by the saving of the surplus growth from the pastures in the form of hay and silage during that period of peak pasture growth.

In the early days of dairying and sheep-farming, extensive areas of supplementary fodder crops were grown and it was then necessary to have a considerable quantity of hay to balance up the watery nature of these fodder crops. Today, however, with the area in fodder crops eliminated or reduced to a minimum in certain areas, this necessity does not exist, but there does arise a necessity to supply a succulent fodder to take the place of those crops. For this purpose there is no better material than well-made silage.

Thus, on those farms where the pastures provide all, or practically all, of the annual fodder for stock, the making of silage becomes a very sound phase of farming, in that it enables a farmer to control his pasture growth, a very necessary factor in efficient grassland management, and it provides a succulent high-class fodder for periods of pasture shortage.

Hay Also Needed

Silage should not be made to the total exclusion of hay, for there is a place for both on an efficiently-managed grassland farm in New Zealand today, but the saving of surplus growth as silage has certain advantages over the conserving of it as hay.

The call for increased production to meet the war-time demands has made it imperative that the surplus pasture of the growing season should be conserved for those periods when grass alone will not adequately sustain the stock. The making of silage is an important method of pasture cultivation, and in this article the basic principles in the making of silage are outlined.

Firstly, silage can be saved in practically all weather that a farmer is prepared to work in. This means that there need be no vexatious delays on account of showery or broken weather, and consequently it enables farmers to cut their surplus growth at the time when it is at its highest feed value.

Where a farmer is making hay it is frequently necessary, because of weather conditions, to postpone cutting from day to day, with the result that the material becomes very fibrous and low in feed value, while, in addition, such delay seriously interferes with the subsequent aftermath growth of the pasture. In districts of high rainfall this is an extremely important point. Even in districts of comparatively low rainfall, however, it is a moot point, for frequently the peak of pasture production occurs early in the season, when the weather is too unsettled for the making of first-class hay.

No Risk of Fire

Secondly, there is no risk of fire when silage is being made, whereas, unfortunately, many a haystack has been either totally destroyed by fire or heated to an extent that makes the material almost useless as a stock food.

Thirdly, well-made ensilage can be held over from season to season with little deterioration taking place. This is a very important factor, especially in districts where two or three bountiful seasons are succeeded by a series of seasons of feed shortage. With a good standby supply of succulent silage a farmer can laugh in the face of adverse seasons.

With silage, the milk yield of wet stocks can be fairly well maintained through periods of drought conditions, whereas the feeding of hay alone at such times would result in a falling away in the milk yield. One of the greatest alleged drawbacks to the conservation of fodder as silage is the heavy nature of the work said to be entailed in harvesting the green material. With present-day machinery, the cost of which is within the reach of the average efficient farmer, the making of silage entails no heavier manual labour than does the making of hay. Especially is this true of the farm where mechanisation has been kept in line with modern methods.

Quality of Material

Silage can be made from all types of green crops, but in this country it has been found that the growing of special crops of oats, etc., for silage is hardly warranted, and that in the main it is the surplus pasture growth that is so conserved. A point worth remembering is that the quality of any silage will depend upon the quality of the green material, and that if silage is made from inferior material, such as roughage, weeds, etc., the resultant fodder will be inferior in feed value. The old saying that "you cannot make a silk purse out of a sow's ear" rings true in this respect. At the same time it is as well to remember that roughage, etc., should be removed, and that it can be made into a silage which, though low in feed value, is edible.

The quality of silage depends not only upon the species of grasses and

clovers from which it is made, but also upon the stage at which such species are cut.

It is an accepted fact in farming today that young growing grass has a much greater feed value than grass which has become mature, so that it is an advantage to cut the crop on the young, rather than on the old side. Naturally, a certain amount of growth must be allowed before cutting can begin, otherwise the bulk will be so small that the feed units obtained will be costly and uneconomic.

As a general rule, cutting should begin just before the seed stalks appear, and at this stage the crop will be at its maximum point of leaf growth. Another advantage in handling young leafy material is that such material gives a wide range under which first-class silage can be made, and there is little risk of a failure or partial failure.

Nothing Mysterious

There is nothing very mysterious about the making of silage, and in actual practice it will be found that it is easier to make good silage than it is to make good hay. When any green sappy material is heaped together bacterial action is set up and fermentation takes place. With the exclusion of air this fermentation is halted, and the mass can then be held in that condition for a long period, providing air is not readmitted or allowed to get in. This, briefly, is the principle of the making of silage.

It will thus be seen that the main factors of success in this phase of farming are (1) the cutting of the material in a green sappy condition; (2) the gathering of it into a heap as soon as possible; and (3) the ability to exclude air from the mass. These last two factors can best be accomplished in the pit or stack, and explains why these two methods are both popular and efficient.

Silage of good quality can be made in the stack, but this process requires a little more experience, while there is usually more waste in the stack method. As an offset against this, however, is the fact that the stack can be built anywhere on the farm, while it can also be made to accommodate any quantity of material. With the pit or trench it is necessary to have suitable locations on the farm and, once built, the site becomes permanent and this may entail long cartage to or from this site.

Time Factor

In making silage it is essential that the green material should be put into the stack as soon after cutting as possible. This is not so necessary where the pit or trench is being used, and it is often an advantage to allow the material to wilt slightly in the field before being carted in. A sweet, or very slightly sour silage should be aimed at, and if the material becomes too dry the temperature will go too high before the air is excluded, and a brown or burnt silage of inferior feeding quality will result. The same will happen if there is too great a delay in the harvesting, and where silage is being made in the stack it is expedient to carry on on successive days, until the job is done.

With leafy green material, however, a day between operations can be allowed without any great danger of the silage being reduced in feed value. These spells will allow the material to settle a little before operations begin again, but with a mechanical lift or hoist there is little advantage in this. With the pit or trench, where the material is tramped and packed more densely than in the stack, a spell of a day or more between sections is advisable, otherwise a very sour silage will result.

Packing of Edges

In building a silage stack every care must be taken to see that the edges are tightly packed to ensure the total exclusion of air. The better job a farmer makes in this respect, the less waste there will be in the stack when the time comes for feeding out. As previously mentioned, the exclusion of air controls fermentation, so that another advantage of the short leafy green material, apart from its higher feed value, is that it packs more tightly and thus controls the temperature.

In the early days of making silage it was deemed necessary to take the temperature at the centre of the stack, and proceed with, or delay building, according to temperature. Today, the thermometer has been dispensed with, as it is realised that there is little risk of the temperature remaining too low, but great risk of the temperature going too high, so that with continuous building in the stack, or building on alternate days in the pit or trench, this high temperature is avoided.

At times controversy takes place as to whether stacks should be square, rectangular, or round. Actually it matters little, although with a round stack there is less wall area exposed to the weather, and as it is on the walls that waste takes place, this lesesr area on which there can be waste is an advantage. At the same time, if a stack builder feels more confident when building a square stack he should adopt this shape. The stack should be built as high as possible, consistent with the degree of safety necessary to ensure that no canting takes place. With a low, squat stack covering too much ground, a poorer quality silage usually results, while there is much waste.

Covering Recommended

On completion of the building with the green material the stack should be topped up with a foot to 18 inches of soil, and the edges of the stack should be so built that it is possible to get the full weight of the soil right out. This weighting with soil is to ensure that the air is excluded from the top three or four feet. Even with pits and trenches it is an advantage to top up with soil, although some farmers do not do so, and little waste results. Much depends upon the leafiness of the green material; if this is young and succulent, little waste occurs, even where no soil is employed in topping up.

As the time is now rapidly approaching when pastures will be at their peak of seasonal production which will, on most farms, result in a surplus of grass, farmers should give some consideration to the saving of this surplus as silage. It is in the interest of the pastures that this growth should be removed, and in the interest of the stock that this should be saved in its most succulent, nutritious, and palatable form.

Farmers desiring further information in connection with this important pnase of dairy, sheep, and mixed farming should get in touch with the nearest Instructor in Agriculture of the Department of Agriculture, and this officer will call and discuss the whole matter with them.

Cobalt Deficiency in Sheep and Cattle

Advice to Farmers for Topdressing, Drenches and Licks

Joint Recommendations of DEPARTMENT OF AGRICULTURE and CAWTHRON INSTITUTE.

BUSH sickness, which occurs in a number of districts in New Zealand, belongs to a group of diseases which are found in parts of Australia, Africa, America, and the British Isles. The first reference to this type of disease appeared in 1831 when a disease called "Pine" was described as affecting sheep in parts of Scotland.

Only sheep and cattle are known to be affected; horses appear to be completely immune. Sheep are more susceptible to the disease than cattle and young animals suffer more than mature animals of the same species. The disease is characterised by loss of appetite, depraved appetite in cattle, progressive emaciation, some diarrhoea, especially in calves, and anaemia which sometimes does not make its appearance until very late in the course of the disease.

It has long been known that grazing on certain well-defined areas induces the disease and that if affected animals, even though in an advanced stage of the disease, are transferred to sound areas they completely recover without any form of medicinal treatment. The recovered animals can then be returned to the affected areas and will remain healthy for a considerable time, but eventually become affected again.

First Treatments

Although earlier experiments had shown that dosing with certain iron compounds had some beneficial effect, it was not until 1918 that any effective medicinal treatment was discovered. In that year New Zealand workers found that drenching with iron and ammonium citrate cured affected animals and its administration either as a drench or in the milk prevented the occurrence of the disease in calves. Unfortunately this drug was somewhat unpalatable and was not readily taken in "lick" form. Various other iron compounds were tried until experiments conducted in 1931 resulted in the use of certain limonites becoming the standard practice for curing and preventing bush sickness in New Zealand.

As the result of investigations into the prevention of bush sickness by the use of cobalt it is now possible to recommend to farmers in the districts concerned methods by which they can economically prevent the incidence of the disease. These recommendations are made jointly by the Department of Agriculture and the Cawthron Institute.

These limonites when mixed with salt were readily taken by both sheep and cattle and their use resulted in the complete control of bush sickness. Unfortunately it soon became apparent that all limonites were not equally efficacious and this led to some disappointment.

On account of the varying results obtained with different materials supplying iron the inference was drawn that bush sickness was not caused solely by a deficiency of iron and that a deficiency in some other trace element was concerned in its occurrence.

Cobalt Discovery

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and 1934 a group of Western Australian workers announced that an extract of potent limonite from which all the iron had been removed was effective in curing "wasting disease" in sheep and cattle. In 1934 South Australian workers demonstrated that cobalt played an important role in the cure of "coast disease," and early in 1935 the Western Australian workers showed that cobalt cured "wasting disease," and was the potent element in limonite.

Following on the announcement of the Australian work, investigations in the same year quickly showed, first in the South Island and later in the North Island, that cobalt salts cured bush sickness and other related sheep ailments, and that cobalt was actually deficient in the soils and pastures of the affected districts. Examination of animal organs gave confirmatory evidence that cobalt and not iron was the potent element in the cure of bush sickness and of Southland lamb ailment.

The elaboration of a satisfactory technique by New Zealand chemists for the estimation of cobalt in minute amount paved the way for extensive soil and pasture surveys with a view to defining the limits of cobalt deficient country in New Zealand. A great deal of data has been accumulated and it is now possible in a general way to indicate the areas in which cobalt deficiency is likely to produce disease in grazing stock.

Deficient Areas

The most important cobalt deficiency area in New Zealand is the region covered by the extensive pumice showers in the North Island. Affected areas extend out from the Central Plateau of the North Island towards the upper parts of the Waikato District and Tauranga to the North, over parts of the Bay of Plenty District and Gisborne-East Cape back country through Wairoa nearly to Napier on the east, towards Taihape on the south and to Taumarunui, Kopaki, and near Te Kuiti on the west. This description by no means exactly defines the extent of the pumice showers, but indicates the main areas affected.

In the Mairoa district west of Te Kuiti and in parts of North Auckland the disease occurs mainly on soils derived from darker, volcanic ash and rocks from which part of the mineral matter, including cobalt, has been leached out or rendered unavailable. There are indications of some deficiency in parts of the Waikato, Eastern Taranaki, and Wanganui districts outside the described areas.

Pumice areas are not found in the South Island, but the soils derived from the coarse crystalline granites which are well distributed in Nelson Province are usually similar in general characteristics, as well as in cobalt content, to the pumice soils of the North Island.

Bush sickness is found on granite soils at Glenhope, in the Sherry Valley, Dart Valley, and Wangapeka districts in the Nelson Province, and all granite soils should be suspected. The Pakihi soils near Westport and at Onekaka are deficient in cobalt and there are indications of a deficiency in parts of the Westhaven and Grey-Reefton Valley districts and on dune and recent blown sands near the coast at Karamea and Westport. In Southland the disease is found in the Morton Mains district, on soils derived in great part from glacial rock-flour or loess.

The most frequent type of soil associated with the disease is the loose, sandy soil which allows of free drainage.

It should be realised that all farms within the deficient areas are not necessarily affected and that isolated farms may be affected outside those areas.

Applied as Topdressing

In 1936 cobalt was first applied to pastures as a topdressing, and it has since been shown that the application of quite small amounts results in the cobalt content of the pasture being raised to as much as one hundred times that of its original concentration. The cobalt level reaches its maximum from one to two months after topdressing is applied, and then gradualy falls until it finally reaches its previous level. The length of time that this takes depends on the amount of cobalt applied, but with the rates of topdressing recommended this usually occurs in from four to nine months.

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Grazing experiments have shown that where the topdressing has been applied stock may be successfully grazed for at least one year without further treatment of the pastures. This means that, providing cobalt is added to the superphosphate used in the topdressing, sheep and cattle can be successfuly grazed in the bush-sick areas without receiving any treatment in the forms of licks or drenches.

So much for the history of the investigations. As a result of these it is now possible to make recommendations to farmers in the districts concerned whereby they can economically prevent the incidence of bush sickness, and it is for this purpose that the present article is being issued.

Diagnosis

Where bush sickness is suspected the first step to be taken is to make certain of a correct diagnosis, for it cannot be too strongly emphasised that cobalt is not a "cure all," and its administration to ailing stock in areas not affected with cobalt deficiency is bound to prove disappointing. Veterinarians and Inspectors of Stock of the Department of Agriculture are all familiar with the symptoms of bush sickness and will at all times be ready to offer their advice.

In arriving at a diagnosis, the following considerations are of great importance. First of all careful note should be taken of the animals which become affected. Weaned lambs are the most sensitive of all domesticated animals to cobalt deficiency. These are followed by mature sheep, calves between six and eighteen months, and mature cattle, in that order. Unweaned lambs and calves are sometimes affected, but the disease seldom appears in its acute form until after weaning. Horses are never affected.

This means that if sheep, especially weaned lambs, show symptoms of unthriftiness, while horses and mature cattle remain healthy, bush sickness may be suspected, but if the weaned lambs thrive no unthriftiness in other stock should be attributed to cobalt deficiency. Evidence that the transfer of affected sheep or calves to a sound area induces recovery would greatly strengthen the suggestion of cobalt deficiency.

Convenient Drench

If the above considerations suggest that animals are suffering from bush sickness a few of them should be drenched with a cobalt solution and their reaction carefully noted. The weighing of these animals will assist a correct diagnosis of cobalt deficiency as improvement in condition quickly follows the use of cobalt drench in cases of bush-sickness. It must be remarked, however, that as a general rule the improvement in health can readily be detected by the eye.

A convenient drench* may be made by dissolving 1oz cobalt sulphate in 1 pint of water. This forms a concentrated solution of which 1 fluid ounce should be diluted with 1 gallon of water. One fluid ounce of the diluted solution should be given to the affected sheep twice a week. The corresponding dose for cattle is five fluid ounces. If they are suffering from cobalt deficiency marked improvement will be noticeable by the end of six weeks.

Samples for Analysis

The local Veterinarian, Stock Inspector, or Fields Instructor should be consulted in any case of suspected cobalt deficiency, and these officers, if considered necessary, will obtain samples of pasture and animal organs for analysis. In the North Island these should be forwarded to the Chief Agricultural Chemist, Wellington, and in the South Island to the Cawthron Institute, Nelson, by the most rapid means of transport available.

Two pound samples of pasture uncontaminated by soil should be obtained. The most reliable results are obtained from well-grazed pasture (two to four inches high) collected during the spring or early summer, as it has been found that analysis of such samples give the best guide to the status of the pasture. Recent work has shown that a seasonal variation occurs in the cobalt content of pasture, and even in the case of bush-sick areas pasture samples collected at other seasons of the year occasionally may give abnormally high results.

It has been found that the cobalt concentration in the liver of affected animals is likely to be of value in diagnosing bush sickness. It is therefore advisable to forward the liver of an affected lamb for analysing. This should be sent in a glass jar having a lid which is so constructed that no metal can come in contact with the liver. No preservative should be added.

Cobaltized Superphosphate

If the disease has been definitely diagnosed as bush sickness the cobalt should be supplied to the stock in one form or another. Where topdressing is a usual practice the best method is to ensure an increased concentration of cobalt in the pasture by adding cobalt compounds to the superphosphate topdressing. In North Island experiments

*In future cobalt sulphate will be made available for purchase at the District Offices of the Department of Agriculture with printed instructions concerning dilution formula.

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5oz of cobalt sulphate per acre applied in the autumn topdressing have maintained stock healthy throughout the following year. In the South Island no field experimental data are yet available concerning the value of the 5oz topdressing, but analytical pasture data suggest that for the fat lamb trade in Southland the addition of this amount of cobalt sulphate to the spring topdressing would give satisfactory results.

It must be emphasised that cobalt topdressing at this rate is not likely to be effective for more than one season and annual applications would be necessary to ensure freedom from bush sickness.

The use and value of heavier applications of cobalt salts are under investigation at the present time, but complete results are not yet available.

It may be stated generally that the effects of quantities of cobalt sulphate in excess of 5oz per acre last for a longer time than that of the 5oz application, but the duration of the effect is not proportional in many cases to the quantity of cobalt used.

It would appear on several soils that a considerable percentage of the cobalt applied in the dressing is locked up in the soil in an unavailable state. Cobaltized superphosphate is now being prepared by the fertilizer manufacturers in New Zealand. It is available in two grades containing 6lb and 3lb cobalt sulphate per ton which means that 2cwt of fertilizer provides 10oz and 5oz of cobalt sulphate respectively.

On theoretical grounds the use of heavy topdressings of lime might detrimentally affect the intake of cobalt by pasture plants. Recent field experimental work, however, has not given any evidence that a detrimental effect does occur with normal application of lime. As a safety measure, however, it is suggested that where lime topdressings are required, they should precede the application of cobaltized superphosphate, and that an interval of several weeks should be arranged before the topdressing of cobaltized superphosphate is made.

Licks

In hill country where topdressing is not practised the feasibility of supplying cobalt sulphate to the pasture mixed with a readily available diluent such as sand might well be considered. In other cases the cobalt should be exhibited in the form of a lick and the following formulae have given good results:—

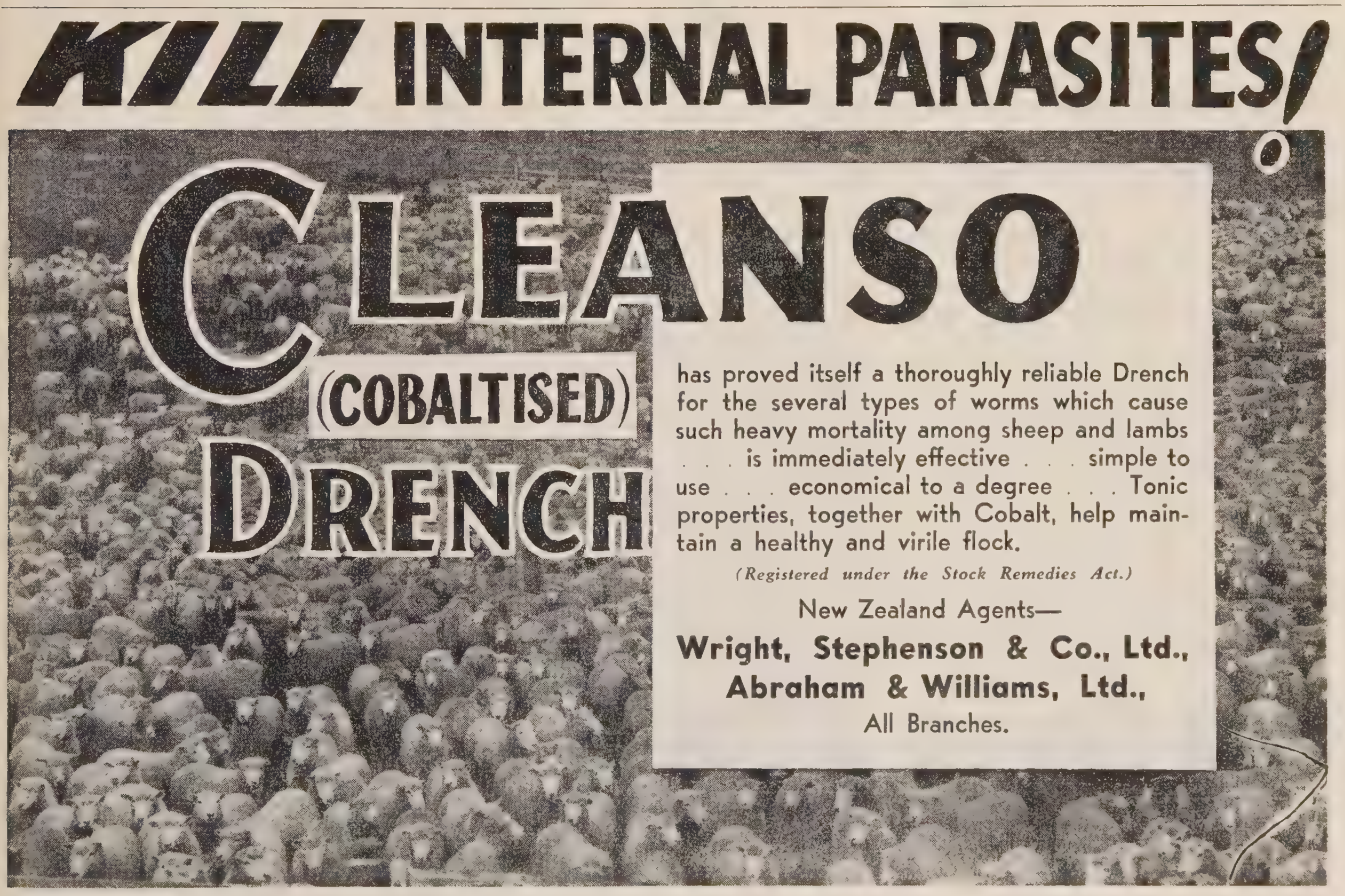
Formula No. 1.

1oz cobalt sulphate.
4cwt salt.
1cwt linseed meal.

Formula No. 2.

1oz cobalt sulphate.
2½cwt salt.
2½cwt steamed bone meal.

In order to enable the farmer to mix his own lick, should he so desire, the Department of Agriculture has issued 5lb bags of cobaltized salt which is coloured a distinct red to enable it to be thoroughly mixed with the other ingredients. Each bag contains 1oz of cobalt sulphate. The lick should be exhibited in boxes which ensure its remaining dry. It is, of course, necessary to make certain that the stock take sufficient lick to supply their cobalt requirements. This will be done when 6lb of the above lick is eaten in a week by 100 sheep. The corresponding weekly requirement for 100 cattle would be 30lb.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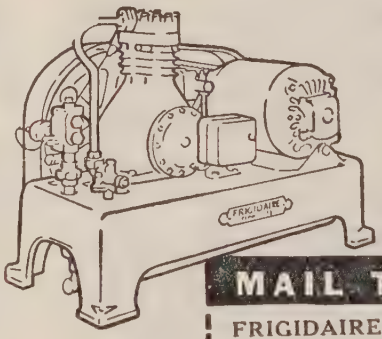

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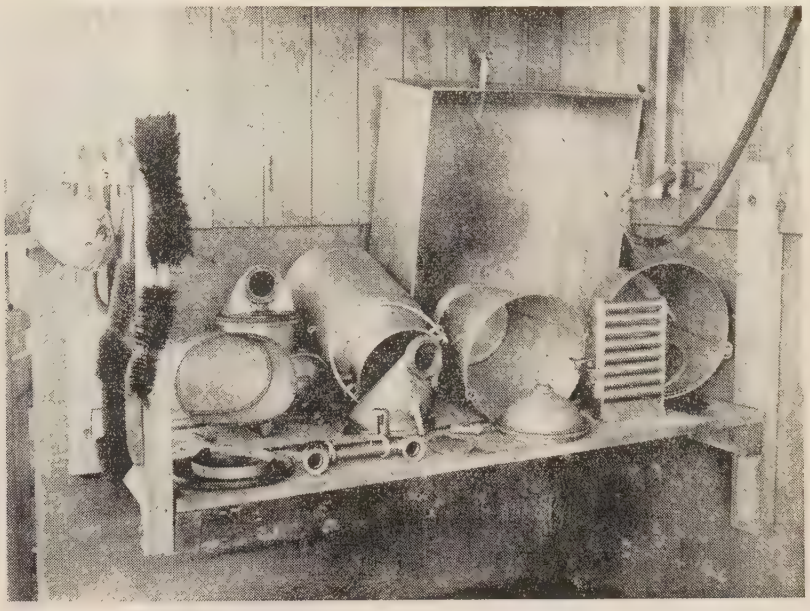


Milk room utensils on the drying rack in the separator room.
{H. Drake, photo.

THE annual procedure to be followed in cleaning a milking machine is as follows, but as they are of many types it does not apply to all makes.

(1) Immediately after milking draw cold or luke-warm water through each set of cups to remove the milk until the water discharged is clear.

(2) Wash the outsides of the teat cups and tubes with a solution of four gallons of warm water and one teaspoon of caustic soda. Rinse with hot water.

(3) Stop the pulsator so that the outside flap of the releaser will remain closed. Where glass interceptors are used they must be fitted with springs to allow for expansion, and thus prevent them being broken.

(4) Draw one gallon of boiling caustic soda solution as above through each set of teat cups. Better results will be obtained if this solution is put through two sets of tea cups at once, and if the cups are lifted out of the water at intervals.

(5) While the first two bails are being treated, lift the flap or plug from the end of the milk pipe and insert a suitable brush or 6 in. length of loosely plaited horsehair.

(6) Hold until the vacuum has again risen, then release, allowing the brush to travel through to the releaser. When the releaser is full the water will overflow into the vacuum tank and clean the connecting pipe.

(7) Catch the soda solution from the releaser in a bucket by removing the plug from the end of the milk pipe. It is better not to catch this water in the separator vat.

(8) Follow immediately with clean boiling water at the rate of two gallons for each set of cups. Use sufficient to fill the whole system and overflow into the vacuum tank.

(9) To clean the air system stop the pulsator so that the water can be drawn through the slide. Detach the air tubes and draw at least a quart of boiling caustic solution through them. This water will pass up through the pulsator slide to the vacuum pipe and into the vacuum tank in the double pipe machine. In the single pipe machine it will pass into the milk pipe, and for that reason the air dropper from the milk pipe to the claw should be cleaned after the first lot of cold water has been put through in this type of machine.

(10) Follow the same procedure with the pipe attached to the lower chamber of the releaser.

(11) Having emptied the plant, draw air through the pipes to dry them off, raising the vacuum and then allowing an inrush of air through the main milk pipe.

(12) Leave all plugs and taps open.

(13) Scrub and scald the vacuum tank.

A milk room at floor level of delivery trucks.
{H. Drake, photo.

(14) Dismantle and thoroughly wash and scald the releaser, and do not reassemble until next milking.

(15) Disconnect teat cups and rubbers from the milk pipe, and hang in a clean place protected from dust and the sun's rays.

If thoroughly carried out after each milking, this procedure will keep a milking plant in good order, and it will be unnecessary to dismantle it at intervals. Where steam is available, the boiling water may be followed by passing steam through the pipes until it shows a temperature of at least 200 deg. F. at the releaser end, where it is discharged.

Either boiling water or steam will cause a deposit of milkstone in the pipes unless they are thoroughly washed before it is put through them, and this will provide a breeding ground for germs, which will cause faulty milk. This can be removed by the use of hydrochloric acid, but as it is not a simple procedure the Farm Dairy Instructor's advice should be sought before attempting to carry it out.

The Air System

Probably the most neglected part of a milking machine is the air system, and it took many years of instructional work to convince users of the necessity for cleaning it. Apart from instances where a broken inflation allows milk to get into the air pipes, they gradually become coated with a deposit which imparts to the milk and cream a flavour which cannot be mistaken, clearly indicating the necessity for strict attention being given to it.

The small vacum tanks used nowadays in some machines make this a difficult task unless they are fitted with a cock or an automatic flap which can be opened to let the water out by removing a plug to break the vacuum. In actual practice a large galvanised iron tank is more satisfactory than a small tinned copper one.

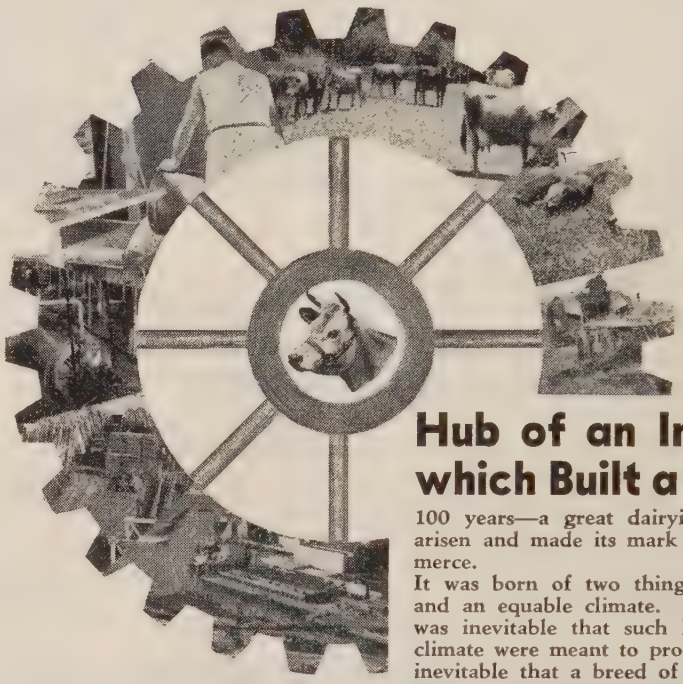
The vacuum tank should be placed as close to the pump as possible in order to reduce the length of pipe between them, as this is a section through which the wash water does not pass. Many installations are now made in which the releaser, vacuum tank, and pump are all fixed on a level on the partition between the shed and the releaser room, and in this case a minimum of piping is required.

Two points must be kept in mind when washing machines which are equipped for releasing in the bail—(1) Because of the comparatively large amount of metal contained in the bail releaser it will take a larger quantity of boiling water to scald it thoroughly and retain the heat required to scald the milk pipes as it passes through them to the releaser room; (2) where milk is being released in the bail, the pipes between the bail and the vacuum pump become coated with milk vapour and are frequently found to be in an unclean condition unless attention is given to this part of the machine.

Other sources of contamination in a milking plant are the vacuum pump, which is frequently found to be dirty, and perished rubberware. Clauses (20) to (25) of Regulation 4 require that all rubberware shall be branded with an indelible mark indicating the name of the manufacturer. Deterioration may be due to neglect, and is most frequently caused by a deposit of fat being left on the rubber as the result of inefficient washing and scalding.

Cleaning Utensils

So far, this article has dealt with the cleaning of the milking machine, but it should not be thought that this is the only part of the equipment which



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requires attention. Regulation 5 requires that all dairy utensils shall be properly washed and scalded immediately after milking. This includes all cans which have been used for the delivery of milk or cream to a manufacturing dairy, even though they may have been so treated before being returned to the farm.

It further requires that in every supplying dairy at which seven or more cows are milked an adequate water supply and heating plant adjacent to the dairy shall be provided to enable this to be done.

Provided these instructions are efficiently carried out, no difficulty will be experienced in keeping a milking plant and dairy utensils in such condition that the milk and cream produced will be practically free from contamination, except such as may have been present before milking. There will be no necessity to use expensive cleansers or sterilising compounds, as caustic soda and boiling

An internal race shed with welded tubular bails and the sides of the dummies hinged. Note the exit race at the right-hand side of the shed.

[H. Drake, photo.

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water will do all that is required. Two points must not be neglected—first, efficient washing of the plant, and second, thorough scalding with boiling water.

Cooling

Even with the best of care milk will not, of course, be sterile, and consequently cooling is necessary in order to check the growth of the germs which it contains. For this purpose a tubular milk cooler is quite satisfactory, and should be of such size that the milk can be cooled to within two degrees of the inlet water available. For a two to three cow plant a cooler 9 in. high by 24 in. long and for a four to six cow plant 9 in. high by 42 in. long have been found to give good results.

Chute coolers from the releaser to the milk stand are seldom satisfactory, as they do not cool efficiently, are hard to wash and scald, and are frequently traps for dirt.

The chute cream cooler is not an efficient one, but there are a number of makes of round and flat vertical tubular coolers, and others of the vertical types which are quite satisfactory.

Points worth noting in this connection are that the night's milk should be spread over the whole of the cans in use for holding until next morning, but the morning's milk should not be mixed with it for delivery to the factory. The latter precaution should also be taken with cream, as mixing, especially when the cream is not cooled, is a fertile source of trouble from undesirable flavours.

Clauses (4) and (5) of Regulation 10 require that both milk and cream shall, immediately after it is milked or separated, be cooled to 65 deg. F. Clause (1) prohibits the use of poisonous or markedly odorous disinfectants on cows' teats. Other clauses deal with the tinning of all utensils with which the milk and cream came into contact, protection from the sun, and from the entry of any bird, animal, etc. The responsibility for the last three is shared by the persons in whose possession the milk and cream happen to be for the time being, whether it be the supplier, carrier, or the dairy company.

Diseases in Pigs

Although there has been a reduction in preventible pig diseases, there is still room for further care. The number of rejections for pleurisy is still too high, and there is room for more improvement in the housing and feeding of very young pigs. The rejections for wounds and bruises are still too high, and call for more careful handling of the pigs on the farm, on trucks, on rail, and at the works. Outbreaks of mange occurred in the Auckland and Otago districts during the year. The outbreaks were successfully cleared up and the disease eradicated on each farm. *Necrotic Ulceration of the Skin* continues to be a cause of the rejection of pigs for export. The amendment to the Stock Act intended to include this disease in pigs when exposed for sale will assist in preventing the spread of the disease.

—Annual Report of the Director Livestock Division.

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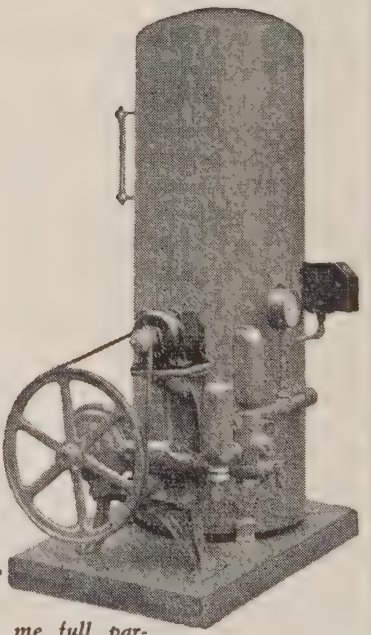

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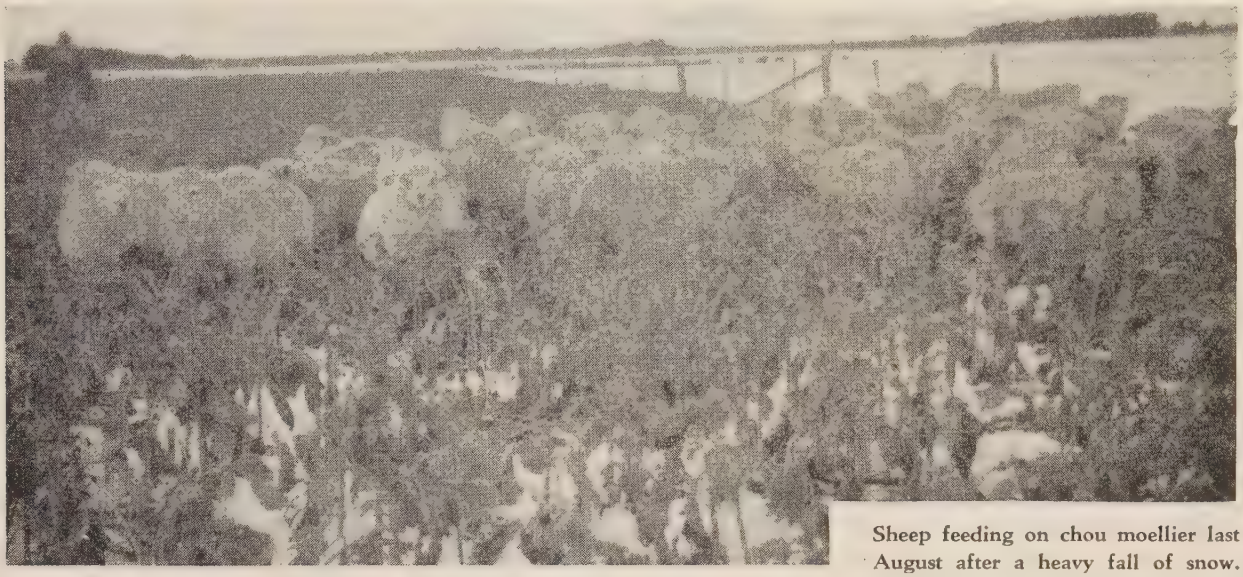

Sheep feeding on chou moellier last August after a heavy fall of snow.

Chou Moellier As Fodder Crop

Production of Heavy Yields Of Highly Nutritious Feed

G. K. McPHERSON, Instructor in Agriculture, Ashburton.

CHOU moellier, or marrow stem kale, which belongs to the same family as turnips and rape, is a hybrid resulting from the crossing of two distinct varieties—kohl rabi and thousand head kale. The plant possesses good qualities of both parents—a tall, thick, nutritious stem and abundant leafage.

Chemical analysis shows the dry matter content to be almost double that of turnips. In addition, chou moellier is much richer in digestible proteins and mineral matter than either turnips or swedes. Rape, however, is a more rapid fattening crop, because the starch-protein ratio is better balanced.

Suitable Soils

Chou moellier undoubtedly thrives best on the heavier class of land where the rainfall is moderately high. Where useful crops of swedes can be grown, chou moellier will do well. In Mid-Canterbury it is a popular crop with many farmers in the Highbank district, but its use as a supplementary forage crop has gradually extended in recent years to other localities. Good yielding crops have been obtained on the medium land, and, provided a normal rainfall is experienced, it will grow quite successfully on the light land.

The value of chou moellier as a useful fodder crop is dealt with in this article. In addition to discussing the utilisation of chou moellier, the author describes sowing and manuring practice.

Sowing

Various methods are adopted for sowing the crop, much depending on locality, class of soil, rainfall, freedom from weeds, etc. Some farmers prefer to sow on the flat or on ridges in 28in. rows at the rate of 1lb to 2lb of seed per acre and to intercultivate. Sown in this manner on good land, a very high crop with stems 2in. or more in diameter usually results. If thick stems are not desired the crop can be sown in 14in rows or through every coulter at the rate of 2lb. to 4lb. of seed per acre.

Chou moellier is a useful smother crop, and if yarr is prevalent or the land is inclined to contain much weed growth, sowing in 7in. rows is possibly the best method. It is of interest to record that the crops placed first and second last season in the field competition arranged by the Methven A. and P. Association were both sown through every coulter at the rate of 3lb. to 4lb. of seed per acre. In each case the crops produced a tremendous bulk of leafage, and thick stalks were reduced to a minimum. In Mid-Canterbury sowings can be continued from early November to mid-January, depending on when the crop is required.

Manuring

Chou moellier responds to liberal dressings of fertilisers. As with turnips, the best mixture to use is superphosphate and lime in equal quantities. On the heavy land 4cwt. to 6cwt. of this mixture may be used, reduced to 3cwt.

on the lighter land. Cross-drilling with superphosphate when the growth is 4in. to 6in. high is very beneficial if the crop is at all backward.

Utilisation

Chou moellier can be fed to all classes of farm stock. It is a suitable crop for cattle and pigs, but in Mid-Canterbury it is grown chiefly for sheep feed. It may be used to replace rape for autumn lamb fattening, and for the winter feeding of sheep it is often substituted for part of the turnip or swede crop.

Where snow is likely to remain on the ground for any length of time, chou moellier provides a useful supply of green feed at a time when it may be difficult to give sheep access to either turnips or swedes. Any chou moellier not utilised during the winter months forms a useful green feed crop in the spring for ewes as they lamb. It is usual to feed the crop off in breaks.

Fattening lambs on chou moellier in April. The crop was sown the previous November.

General

Given favourable conditions, chou moellier will produce heavy yields of highly nutritious feed. It is less susceptible to damage by club root and insect attack than turnips, rape, or swedes, and where yields are restricted by these pests, chou moellier could with advantage replace a portion of the area usually devoted to these crops.

Chou moellier is also extremely useful where snowfalls occur. In parts of Mid-Canterbury during the past winter snow lay on the ground for ten days to a fortnight, and farmers with an area of chou moellier were able to feed their sheep on it when other forms of green feed were buried in the snow. Chou moellier possesses one disadvantage in that the stalks are inclined to damage the wool.

The crop of chou moellier grown by Mr. A. J. Penney and awarded first prize in the Methven A. & P. Association's annual field competition. Crop sown January 15, 1939; photograph taken May 2, 1939.

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The Meat Act 1939

Amendments to Law Covering Slaughtering of Stock

A. E. MORRISON, Solicitor, Department of Agriculture.

BEFORE the passing of the Meat Act, 1939, the law relating to the slaughter of stock and the inspection of meat for human consumption was contained in the Slaughtering and Inspection Act, 1908, and its amendments. The Act of 1908 was merely a consolidation of the Act of 1900, and although the main Act had been amended on six occasions since 1908, the law was in a large measure the same as when enacted in 1900—almost 40 years ago. Consequently, the law in many respects required revision to bring it into accord with present-day production and marketing conditions.

Accordingly the Meat Act, 1939, which comes into force on April 1, 1940, repeals the general law contained in the Slaughtering and Inspection Act, together with certain special provisions contained in several local Acts relating to abattoirs, and makes other and better provision in the premises. The new Act is a complete reconstruction rather than a consolidation of the law on this subject, and although the arrangement and language of the repealed Acts have been extensively altered, the material departures from the law as then existing are relatively few in number, and are summarised in the following notes.

Establishment of Abattoirs

By the repealed enactments boroughs with a population of 2000 were required to establish abattoirs for their districts to ensure that all meat for consumption was inspected. By the Meat Act the population requirement is raised to 2500 on the ground that, generally speaking, it would be uneconomical to compel the establishment of abattoirs for the smaller boroughs, having regard to the cost of establishment and the prospective number of stock to be slaughtered in the abattoir. Under 2500 the establishment of an abattoir is optional, thus removing the doubt whether a local authority with a population lower than 2500 is empowered to establish an abattoir for its district.

Express authority is also conferred on a local authority that has established an abattoir to establish and operate, with the approval of the Minister of Agriculture, a boiling down works in connection therewith, and also to carry on subsidiary undertakings in conjunction with the abattoir or the boiling down works, thereby removing the doubt under the repealed Acts as to the power of an abattoir authority to operate a boiling down works in connection with its abattoir. The accounts of the boiling down works or other subsidiary undertakings authorised to be established, however, must be kept separate and distinct from the accounts of the abattoir.

Extension of Abattoir Districts

Under the repealed Act it was doubtful whether two or more local authorities could by mutual agreement combine to establish an abattoir for **defined parts** as well as for the whole of their districts, and whether an abattoir district could by mutual agreement between the local authorities concerned be extended to include a **defined part** as well as the whole of the district of another local authority. Section 14 of the Act removes this doubt.

By section 15 the Minister is empowered in an appropriate case and on the application of the controlling authority of an abattoir to make an order extending the boundaries of its abattoir district to include the **whole or part** of the district of another local authority after giving all interested parties the opportunity to make such representations with regard to the proposed extension as they think fit.

Sale of Meat in Abattoir Districts

The law with regard to the sale of meat for consumption in abattoir districts is tightened up to ensure that, in general, only meat that has been properly inspected is sold for consumption in an abattoir district. Accordingly, section 21 of the Act forbids the sale in an abattoir district of all meat for consumption in the abattoir district unless it has been derived from stock slaughtered in an abattoir or a meat-export slaughterhouse where an adequate inspection service is maintained.

The general prohibition is, however, subject to the qualification that meat from stock slaughtered by a bona fide farmer under the powers contained in section 46 may be sold by him to persons employed exclusively in connection with his farming operations on the farm on which the stock are slaughtered or on any other farm. Meat shall be deemed to be sold if it forms part of a meal for which payment is made or which is supplied to employees.

It will be an offence to have in possession for sale for consumption in an abattoir district meat that has not been dealt with in an abattoir or meat-export slaughterhouse. If meat is found on premises used for the sale or

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storage of meat it will be deemed to be held for sale for consumption until the contrary is proved. The burden of proof that meat was not intended for human consumption in an abattoir district is placed on the person charged with a breach of Section 21.

Abattoir Fees and Charges

Better powers are conferred on an abattoir authority to make by-laws or rules as to abattoir fees and charges. The power to make by-laws is extended to include power to prescribe returns to be furnished to the abattoir authority of meat sold for consumption in its district but not dealt with at its abattoir, and also to prescribe the persons required to make such returns in order to insure that appropriate fees are paid to the abattoir authority on such meat.

Instead of setting out in the Act the particular services for which charges may be made, Section 22 of the Act provides that the several services for which charges are to be made must be set out in the by-law. The charge to be fixed for any particular service must be a bona fide and reasonable charge based on the cost of rendering that service.

In addition, a charge may be made for inspection, and also a charge for the use of the abattoir. The charge for inspection must not exceed the inspection fees payable to the general Government. The charge for the use of the abattoir must be fixed on the basis of the cost of establishing and maintaining the abattoir. This cost must include only such specific items of expenditure as are set out in the by-laws so as to insure that no item of abattoir expenditure is taken into account in fixing the charge for the use of the abattoir which should be the subject in whole or in part of a charge for any specified service rendered at the abattoir.

The fees payable on meat dealt with elsewhere than in the abattoir of the controlling authority and sold for consumption in its abattoir district must be the same as the charge for the use of the abattoir, but must not include any fee for canned meat or bacon or ham or meat intended for canning, or pork intended for curing as bacon or ham.

In the case of meat dealt with in another abattoir the fees shall be payable by the person who sold or is deemed to have sold the meat for consumption in the abattoir district, and where there has been more than one sale of the same meat the fees shall be payable by the person who first sold or is deemed to have sold the meat for consumption in the abattoir district. In the case of meat dealt with in a meat-export slaughterhouse the fees shall be payable by the licensee.

Where parts of carcasses only are sold for consumption in an abattoir district the number of carcasses on which fees shall be payable shall be ascertained by dividing the actual weight of meat from stock of a particular class that is so sold by the fair average dressed weight of stock of that class. The fair average dressed weight of stock of any class must be fixed in the by-laws.

Under the repealed Act all by-laws required the prior approval of the Governor-General before they came

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into force. The new Act provides that all by-laws must be approved by the Minister instead of the Governor-General before they come into force, and that the Minister may disallow a by-law by giving to the abattoir authority not less than three months' notice of his intention so to do, thus securing a continuous right of review of abattoir fees and charges for the time being in force.

Application of Revenue

Section 23 of the Act removes the ambiguity in the repealed Act under which a refund of fees paid to an abattoir authority was authorised to be made to non-users of its abattoir after the Minister had determined that the fees and charges brought in more revenue than the maximum therein permitted, but refunds could not lawfully be made to the users of its abattoir who had contributed part of the abattoir revenue. Instead of the annual cost of the abattoir being determined on the basis of its actual cost, plus 7 per cent. of the capital expended in establishing the abattoir, as provided by the repealed Act, subsection (6) of section 23 sets out in detail the items of expenditure which may be included as part of the annual cost of an abattoir.

The abattoir authority is required to prepare a statement of its income and expenditure in respect of its abattoir for each year, and to make available to the payers of fees and charges copies of such statement or cause a copy of such statement to be published in a newspaper circulating in the abattoir district. Where the fees and charges for any year exceed the annual cost the surplus is refundable to both users and non-users of the abattoir in proportion to the total amount of the fees and charges paid by them. Public notice must be given of the period within which refunds will be received by the local authority and a personal notice must also be given to all persons entitled to a refund of not less than £5.

Surpluses may, with the approval of the Minister, be accumulated for distribution at the end of two or more years where the amount available for distribution is so small as not to warrant distribution, having regard to the cost involved thereby. Alternatively, a surplus may, with the approval of the Minister, by a general reduction of fees and charges, be absorbed by being taken into account in the revenue of the abattoir for the next succeeding year. No refund shall be made of amounts less than 5/-, and such amounts must be paid by the abattoir authority into a renewal or depreciation fund established by it in respect of its abattoir or into a sinking fund established in respect of any abattoir loan.

If, in the case of a refund, surpluses are not claimed within six months of the time they have been made available they may be paid either into any such renewal or depreciation fund or into any such sinking fund. The decision of the local authority as to the persons entitled to refunds shall be final. If in any year the revenue of the abattoir, together with any undistributed surplus authorised to be taken into account, is less than the annual cost the deficiency shall be carried forward and deemed to form part of the annual cost for the next year.

An abattoir authority is required to establish a renewal or depreciation fund in respect of its abattoir, and to appoint Depreciation Fund Commissioners to control the investment and application of the moneys in the fund in accordance with the provisions of Part XI of the Municipal Corporations Act, 1933. Section 23 has no application to a person, firm, or company to whom the local authority has delegated its powers in respect of the abattoir for its district.

Slaughter of Pigs For Export

Under the repealed Act certain premises used only for the slaughter of pigs, the meat or part of the meat from which is exported, were licensed as ordinary slaughterhouses. At these slaughterhouses a special inspector is employed to ensure that the pigs are slaughtered under inspection and that the meat is suitable for export. On the operation of the new Act these premises (bacon-curing or pig-slaughtering works) must be licensed as meat-export slaughterhouses.

Rural Slaughterhouses

The term "rural slaughterhouse" is new, and includes all licensed slaughterhouses other than abattoirs and meat-export slaughterhouses. After the commencement of the new Act a licence for a rural slaughterhouse shall not be granted for the first time for premises situated within three miles of the boundary of an abattoir district, but any licence then in force may be renewed for premises that, at the date of renewal, are situated outside the boundary of an abattoir district, thus preserving the existing rights of holders of current licences.

Slaughter and Sale of Stock by Farmers

With regard to the right of a bona fide farmer to slaughter stock for sale for human consumption, section 46 of the Act makes it clear that the place used for the slaughter of stock must be maintained in a proper sanitary condition to the satisfaction of the Inspector. The farm on which the stock are slaughtered must not be in or within six miles of an abattoir district, borough, or town district, the specified limit in the repealed Act being three miles. Not more than one head of cattle **or** five head of other stock shall be slaughtered for sale in any period of seven days, the quantity stipulated in the repealed Act being one head of cattle **and** five head of other stock.

No part of the meat shall be sold to any butcher, bacon curer, or purveyor of meat; nor shall any part be sold to any person for consumption in or within six miles of an abattoir district, borough, or town district, the limit specified in the repealed Act being three miles. Nevertheless, any meat derived from stock slaughtered by a bona fide farmer may be sold by him to any person who is regularly employed by the farmer exclusively in connection with farming operations on the same or any other farm.

Meat sold to a person resident in an abattoir district, borough, or town district or within the six-mile limit shall be deemed to be sold for consumption in that district or area until the contrary is proved. A farmer who owns an hotel, boarding house, or restaurant in an abattoir district and who supplies meat from stock killed on his farm for consumption in the hotel, restaurant, or boarding house by persons as part of a meal for which payment is made is deemed to have sold the meat to the persons to whom the meals have been supplied.

The restrictions referred to apply to pigs as well as to other kinds of stock, but to meet exceptional cases in outlying areas a farmer may be granted a permit by the Minister to sell to any person meat from pigs slaughtered by him.

Compensation for Condemned Stock

The diseases for which compensation shall be payable where stock is con-

demned as unfit for human consumption are:—Actinobacillosis, actinomycosis, anthrax, arthritis, blackleg, caseous lymphadenitis, malignant neoplasms, peritonitis (septic), pleurisy (septic), mange, swine fever, and tuberculosis.

No compensation shall be payable where less than 25 per cent. of the dressed weight of a carcass is dondemned as unfit for human consumption, nor in respect of any stock which before slaughter exhibited obvious symptoms of the disease on account of which the meat derived from the stock was subsequently condemned.

Export of Meat

Section 52 of the Act prescribes the conditions governing the export of meat. By paragraph (f) of subsection (1) provision is made that all conditions imposed on the entry of meat into the country to which it is exported or on sale in that country shall be complied with so far as such conditions can be complied with in New Zealand.

For instance, the branding of meat imported into the United Kingdom with an indication of the country of origin must be complied with in New Zealand. All meat-exporters' licences are placed on the same footing with regard to the date of expiry as other licences, that is, June 30 in each year. Under the repealed Act meat-exporters' licences enured for one year from the date of the licence.

Powers of Investigation

The Minister is empowered to cause investigations to be made into the operations of the controlling authority of an abattoir or into the business of the holder of a meat-exporter's licence or a meat-export slaughterhouse licence or a licence for a rural slaughterhouse in order that the Minister may be armed with full information to enable him to come to a decision on any matter in respect of which discretionary powers are conferred on him by the Act.

Regulations

Extended powers are conferred on the Governor-General to make regulations for the purposes of the Act. Among other matters regulations may be made:—

(a) For the branding, marking, or grading of skins or other products derived from slaughtered stock.

(b) Prohibiting the use of any injurious or detrimental or deceptive processes in respect of meat for human consumption.

(c) For the treatment of calves intended for slaughter (bobby calves).

(d) Approved methods for the slaughter of stock and prohibiting inhumane methods of slaughter.

(e) Publication of particulars of stock slaughtered in abattoirs.

(f) Prohibiting the feeding to dogs of any diseased meat or offal or of any raw offal.

Stock Diseases

Part I of the First Schedule to the Act sets out the diseases which detrimentally affect the quality of the meat derived from stock suffering therefrom. By Section 2 of the Act the list may be extended by the Governor-General. Under the repealed Act the term "disease" was defined by reference to the Stock Act, but the same definition is not appropriate in every case for the purpose of both Acts.

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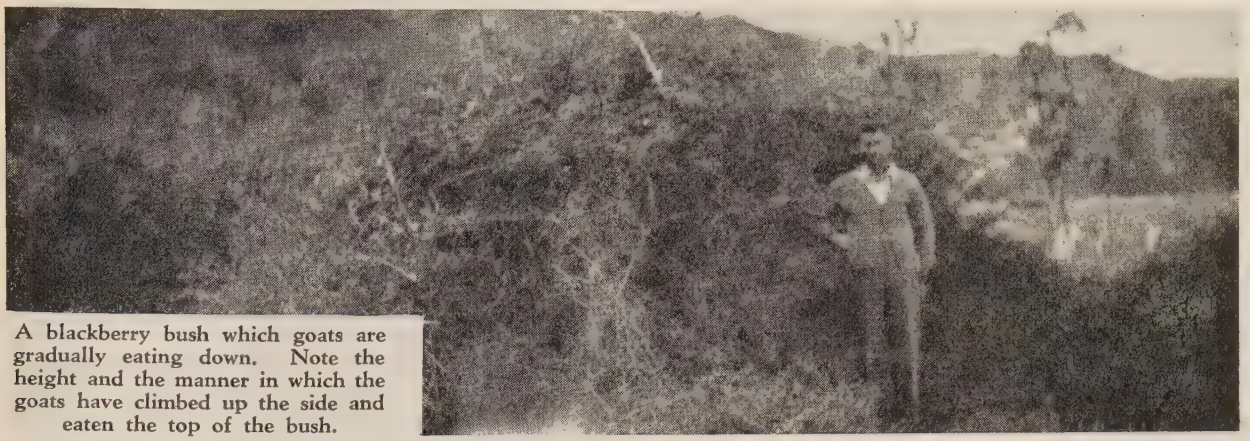

A blackberry bush which goats are gradually eating down. Note the height and the manner in which the goats have climbed up the side and eaten the top of the bush.

Eradication of Blackberry

Valuable Work Done By Goats In Ridding Land Of This Pest

R. P. HILL, Fields Instructor, Hastings.

THE part played by goats in the eradication of blackberry on the East Coast districts of Northern Hawke's Bay cannot be too highly commended. Very considerable areas which had been completely abandoned because of blackberry have in recent years been rehabilitated, and are now carrying pasture and breeding and fattening sheep and cattle. Without goats this would never have been accomplished. However, the goats alone are not the sole means of blackberry control, but goats coupled with good fences, the fire stick, and grass seed and topdressing can certainly work wonders.

The experience of the Opoho Station is an example of how this may be accomplished. Parts of this property were badly infested with blackberry, and in 1934 Mr. J. W. Powdrell realised that something would have to be done to arrest the blackberry from spreading to clean areas. A number of goats were obtained, but they were insufficient to cope with the blackberry, and it took some time before the mob increased enough to demonstrate their value. It was then realised that if the goats were to be really effective in blackberry control the fences must be goat-proof, so that the animals could be controlled.

Goats have played no small part in eradicating blackberry in districts of Northern Hawke's Bay. Coupled with good fences, the fire stick, and grass seed and topdressing, they have brought back into production large areas which had previously been abandoned. Just how this was accomplished is described by the author, who considers that many more farmers could solve their blackberry problems by the same means.

Area Cleaned Up

The accompanying photographs will show how the first area was cleaned up and in June, 1939, was carrying five sheep to the acre, as well as two goats per acre. This area was flat and of approximately 70 acres, and was completely overgrown by blackberry 10 feet high. It was also swampy and badly drained. In the early autumn of 1938 the area was burnt, and two months later the larger clumps which had not burnt up were again fired. The result of these burnings left a tangled mass of burnt and charred blackberry vines.

It was just possible then for men to scramble through and sow grass seed, and when this was completed the land was drained and completely ring-fenced with an eight-wire fence (3in. barb top and bottom). By June the grass was sufficiently established for it to be stocked, and a mob of 200 goats and 300 sheep were turned on. Stocking has been continued in varying numbers right through until the present time.

First Winter

During the first winter the sheep confined themselves to eating the grass, but the goats preferred the blackberry vines and greedily ate everything in reach, until by the end of the winter they had climbed up and pulled down every stalk. During the summer months an increased number of sheep were carried to keep down the grass, and there were never fewer than two goats per acre as well. By February

every blackberry bush was flat on the ground, and it was a common sight to see the goats scratching the sticks to get at any young shoots which were still coming through and also holding down with their hoofs the dry dead vines while they chewed them.

As so much dead material was left on the ground it was thought worth while to drop a match in the heaps, which were dry and burned readily. However, only a limited amount was treated in this way, and later events proved this burning to be unwise, as it was found that, where burnt, all the young grass had been killed out, but where the heaps of vines had been left, in three months time the goats had completely either eaten them up or pulverised them with their hoofs leaving an excellent sole of grass where the heaps had been.

The area was topdressed with superphosphate in March, and in June was all in first-rate ryegrass-white clover pasture, having carried almost continually since first stocking in June, 1938, varying numbers of sheep, and always two goats per acre. Judicious stocking with both goats and sheep will be necessary for at least a further twelve months in order that any blackberry plants which still persist in sending up shoots may be killed.

Typical hill country which has been burnt and resown and on which goats are now grazing. Very little stalk remains uneaten. In the foreground is a goat-proof, eight-wire fence.

This area has been developed at very small cost. Labour costs have been negligible, no clearing has been necessary, and the only expense has been grass seed, some topdressing, and a drain. The fencing, being a permanent improvement, cannot be charged against the work. Other paddocks on steep hillsides are being dealt with in the same manner and with equally successful results.

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Upper left.—A bird's-eye view of the 70-acre block after firing and sowing. Much unburnt growth remains to be cleared up. *Upper right.*—Heavy stocking with sheep in the spring. Goats also are carried, but are insufficient to eat both the grass and the young shoots of blackberry. *Lower left.*—The area three months after stocking with goats and sheep. Only small scattered clumps of unburnt blackberry remain. *Lower right.*—The same area after six months' stocking.

Good Fences Necessary

Mr. Powdrell points out, however, that nothing can be accomplished without good fences to hold the goats where required. If properly managed, goats may be carried on blackberry-infested country without any diminution of sheep-carrying capacity

Goats do their best work in the winter months, as at that time, no matter how much grass is available, they confine themselves to eating the wood and vines of the blackberry. They will keep chewing at bushes until every leaf and branch within reach is eaten, and they will follow this by climbing up over the bushes until the whole bush is weighed down to the ground and they can complete the chewing process until nothing is left.

It is in the spring and autumn months that good fences are so necessary, as at this period there is ample green grass, and this appears more palatable to them than the young juicy shoots of the blackberry.

During these periods the goats must be crowded together with sheep so that they all are compelled to eat the blackberry shoots. This may be done without any harmful effects to sheep, particularly if the mobs of sheep are changed and not left on the same area too long.

The problem of fencing is frequently considered to be insurmountable, and the statement is often made that it is impossible to keep goats confined. There will always be found a few goats more athletic than the average which will jump over fences, but, generally speaking, a well-constructed eight-wire sheep-proof fence will hold goats sufficiently well to control blackberry, provided, of course, it is kept in reasonable repair and the stays are protected so that no goats may climb up them.

Management of Goats

The management of goats must also be studied. They must be quietened and trained to dogs and mustering. At Opoho this has been accomplished by bringing down mobs to the station home paddocks, where they are changed around. This method works in very well, as two crops of young goats occur in a year, one in May and the other in November, and about these periods all mobs are handled and young males castrated. Handled in this manner, no difficulty is ever experienced in mustering whenever necessary.

It is the practice never to allow more than two male goats to run out with every hundred females, and in this way a healthy mob of goats is maintained.

I feel sure that, if more reliable data were obtained and broadcast throughout the country, the information would stimulate many more farmers to solve their blackberry problems systematically by means of goats, not merely stocking up with a few goats, but working them to a plan.

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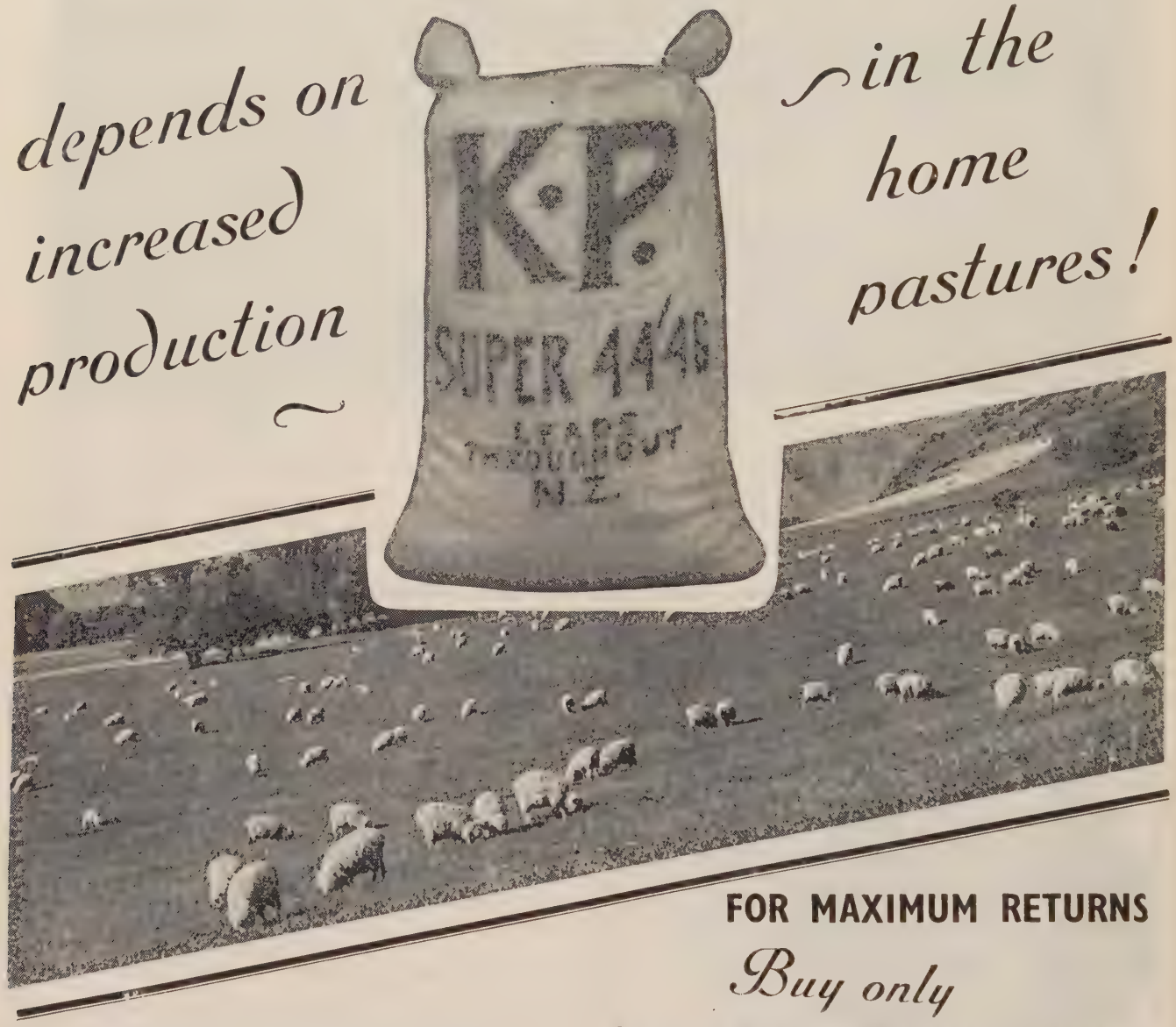

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Grasses and Clovers of New Zealand

Species Which Thrive Under Moist Conditions

— By —

S. H. SAXBY,

Instructor in Agriculture, Dunedin.

(*Continued from October issue.*)

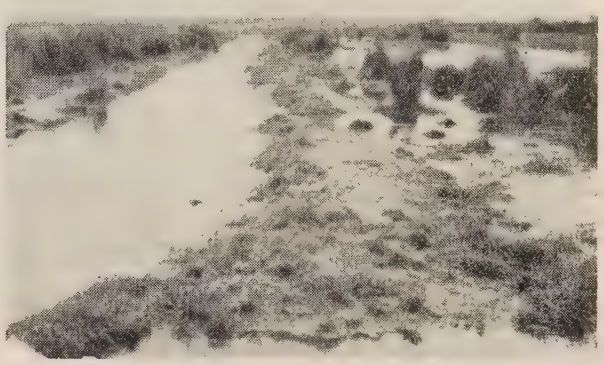

Fig. 20.—There is in New Zealand a considerable area of country subject to periodic flooding for comparatively short periods. Here meadow foxtail, *poa trivialis* and timothy are of considerable value, and should replace many of the poorer existing plants.

[*J. M. Smith, photo.*

GRASSES WHICH THRIVE ON COUNTRY THAT IS POORLY DRAINED OR HAS A HIGH WATER-TABLE.

MEADOW Foxtail (*Alopecurus pratensis*).—This is one of the best grasses for very rich, low-lying dairying country which is poorly drained and liable to be periodically flooded. It is one of the hardiest of our grasses, and will stand severe cold and frost, remaining green throughout the winter. Next to sweet vernal and prairie grass, meadow foxtail is the earliest grass to begin growth in the spring. The feed it produces is of good value, and is relished by all classes of stock. It has the advantage of producing a good quantity of both early and late feed, and thus associates well with regard to the levelling out of the production period with timothy, which is essentially a summer grass.

On country that suits it meadow foxtail becomes thoroughly established in about three years, during and after which time it increases by means of a short tillering root stock. Under conditions which are ideal for its growth foxtail may become dominant in a pasture in about eight to ten years.

Because of its somewhat twitchy nature and its slow establishment foxtail should be used for permanent pastures only. Meadow foxtail is suitable for first-class country in association with ryegrass and timothy, or, where it is too wet for ryegrass, a pure timothy-foxtail pasture is very satisfactory.

The value of grasses which thrive under moist conditions are discussed in this instalment of the articles on the grasses and clovers of New Zealand. The main species discussed are meadow foxtail, poa trivialis, timothy, and one of the worst weeds of high-fertility swamp country, tall fescue. The first three have definite value under certain conditions, but tall fescue may be regarded as a menace.

Meadow foxtail is sometimes confused with timothy because of the superficial similarity of the seed heads. They may be readily distinguished by the fact that foxtail has a long cylindrical seed head of a fluffy appearance, due to the hairs and awns on the florets, whereas timothy has a long cylindrical seed head which is quite hairless. There should be little confusion, as

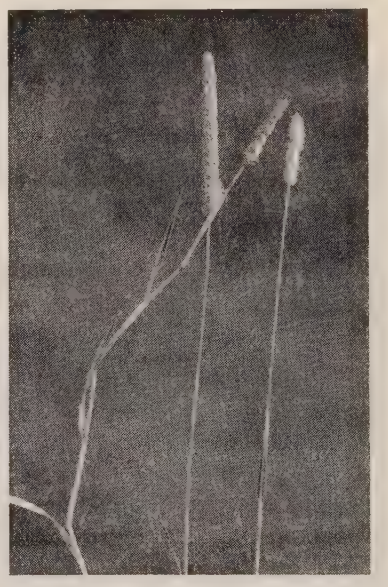

Fig. 21.—The seed heads of meadow foxtail *(left)*, knee-jointed foxtail *(centre)*, and timothy *(right)* are sometimes confused. The first two may be distinguished from one another by the smaller head and the presence of the joints in the stem of knee-jointed foxtail. Timothy has a much rougher type of seed head than the foxtail, and flowers much later in the season. The timothy head illustrated here is considerably smaller than is usually the case.

[*H. Drake, photo.*

foxtail is one of the earliest grasses to flower and timothy one of the latest.

In the vegetative state foxtail may be recognised, as a rule, by the purplish colour of the leaves near the ground, which turn a chocolate brown colour as they become old. The ligule is rather variable in size, but is always blunt and not pointed. The leaf shoot is rounded. Ears are absent.

Another Foxtail

Knee-jointed Foxtail (*Alopecurus geniculatus*).—This is a common perennial grass very similar to meadow foxtail except in size. It will thrive on a similar soil type, and will stand at least as much moisture or flooding as meadow foxtail. It has more of a twitchy or spreading nature than meadow foxtail, and consequently is frequently seen as the dominant grass on very wet pastures, the lowest lying parts of which are frequently dominant floating sweet grass.

Compared with meadow foxtail, this grass is of less value because of its lower production. It is also much later "away" in the spring, being about two months behind meadow foxtail in the time of flowering. In some districts large blocks of country run to dominant knee-jointed foxtail and creeping bent. Here the best purpose which this grass serves is an indication that the existing pasture could be profitably replaced by a dominant meadow foxtail pasture with timothy as an associate if the conditions are not too wet.

Knee-jointed foxtail is very similar to meadow foxtail except that it is much smaller in all respects. It is somewhat more creeping, has a longer ligule, and the stems are frequently bent at the nodes or joints. It is this

Fig. 22.—On irrigated country *poa trivialis* associates well with ryegrass and timothy. As the optimum amount of water is always available, this grass will produce well under these conditions in the summer.

[*S. H. Saxby, photo*

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characteristic from which it derives its name.

Danger of Weeds

Rough-stalked Meadow Grass (*Poa trivialis*).—This is another very common grass that thrives on damp pastures. It is a perennial grass which spreads by means of stolons or overground runners which root at the nodes, thus enabling it to spread rapidly under suitable conditions. Its soil fertility and moisture requirements are similar to those of meadow foxtail, but it will grow on considerably drier and poorer soils. In conjunction with meadow foxtail and timothy this grass forms a valuable and high-producing bottom to the pasture where it makes a good cover.

Poa trivialis is of fairly frequent occurrence on rather poor but retentive soils that are subject to a fairly high rainfall except during the summer months. Under this condition (that is, out of the meadow foxtail-timothy habitat) *poa trivialis* is of very little value, as, although it produces a fair amount of spring feed, its production falls off rapidly when dry spells set in. It then becomes stunted, of a purplish brown colour, and non-productive. After this, practically all the herbage disappears, leaving the pasture open, with a resultant drop in total production. It also paves the way for the ingress of weeds or poor grasses.

Trials with this grass on this type of country have shown that its inclusion in a general mixture has been responsible for a reduction in the yield from the pasture over a period of several years. Here it is really taking the place of better grasses, such as ryegrass and cocksfoot. The feed produced by *poa trivialis* under suitable conditions is eaten quite readily by stock while it is young and vigorous, but is largely neglected when rank.

Fig. 23.—Timothy is a late-maturing grass, and helps to spread the total season's production when associated with early grasses such as meadow foxtail and ryegrass.

[*S. H. Saxby, photo*

Restricted Use

The place of *poa trivialis* in New Zealand pastures is in those pastures that are just too wet to maintain a permanent sward of perennial ryegrass. Rough-stalked meadow grass may be confused with ryegrass, annual *poa* or Kentucky blue grass. It has a typical *poa* leaf—that is, a leaf that has a pair of longitudinal lines running the full length of the blade, the point of which is shaped like the prow of a boat as distinct from the pointed end which terminates the leaves of many grasses. This "poa" leaf is sufficient to distinguish the grass from ryegrass.

Rough-stalked meadow grass has a long ligule, and the leaf is of a light

Fig. 25.—Seed heads of creeping bent *(left)* and browntop *(right)*. Creeping bent always has a compact seed head, and is found on country which is too wet for browntop.

[*H. Drake, photo.*

Fig. 24.—As a constituent of first-class hay, timothy is hard to excel if cut at the right stage.

[*H. Drake, photo.*

green colour. These differentiate it from Kentucky blue grass. The ligules of annual *poa* and rough-stalked meadow grass are somewhat similar, but the plants may be distinguished by the fact that in *poa annua* both surfaces of the leaf are dull, whereas in rough-stalked meadow grass the undersurface is shiny.

The flowering stalks of Kentucky bluegrass and rough-stalked meadow grass are very similar, but may be recognised in that the stalk of the latter is downward rough, while that of the former is smooth.

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IT is not suggested that the Munro Triumph used on Dr. Annett's farm covered 17 acres per hour, as his paddocks are too small for the high speed work the Munro does on large areas. But even a 2-acre paddock, the Doctor said in his letter to us, "was sown in well "under 15 minutes in spite of the "fact that it is not easy to "manipulate a 14-foot machine in "such a small area with an in-"experienced driver. I can readily "realise that it is possible to sow "an acre in 3¼ minutes, as you "claim, given a large level pad-"dock.

"**Evenness of Spreading** was as "perfect as I have ever seen with "any topdresser. Your claim to a "successful type of force feed seems "amply justified, and the faster the "lorry was driven the more rapidly "was the manure delivered.

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Excellent Hay Grass

Timothy (*phleum pratense*).—The conditions required for timothy to thrive are high fertility and a good supply of moisture. It associates well with meadow foxtail on the drier end of that grass's habitat range, and will grow quite well on considerably drier soils. It will not stand the same amount of flooding or surface moisture as meadow foxtail. Timothy is of no value on light or second-class country which dries out badly in the summer. It is essentially a late grass, being one of the latest of the common pasture grasses to flower.

Timothy has two very desirable characteristics. Firstly, it produces the bulk of its leafage in the late spring and early summer, and consequently combines well in a pasture with foxtail and with ryegrass in levelling out the peak production period.

Secondly, being a late maturing grass, it makes excellent hay in districts where weather conditions are responsible for the late cutting of hay crops. In America, where timothy is grown very widely, it is regarded as the best hay grass they have. The feed produced by timothy is eaten very readily by all classes of stock. In association with perennial ryegrass, which goes to seed considerably earlier, the timothy is grazed very closely, and on this account is frequently overlooked, especially when occurring in only small quantities.

Timothy is more valuable in the southern districts than in the north, because in the north districts much better production is obtained from summer grasses such as paspalum dilatatum. In the south, however, these grasses cannot be grown, and under these conditions timothy is the best summer-growing grass on the heavier soils.

Timothy is often regarded as being a cattle grass rather than a sheep grass. This is only partly correct. Firstly, timothy frequently comprises only a small proportion of the sward and, being so palatable, is grazed very closely, with the result that its seed heads are seldom seen in a grazed pasture even when it occurs in fairly large amounts. Secondly, the country on which timothy will thrive is usually more suitable for dairying than it is for pure sheep farming.

Effect of Grazing

In a mixed sward timothy will stand a fair amount of competition from rye-

grass, provided the soil is sufficiently moist. It is not so much the competition from ryegrass which hinders the establishment of timothy as the early grazing that is frequently necessary to control the ryegrass. Light grazings in the early stages will control the ryegrass and not harm the timothy.

The only grasses with which timothy is liable to be confused in the vegetative state are old-man twitch and cocksfoot. Timothy has a bluish colour similar to cocksfoot, but has a rounded shoot and stem, whereas those of cocksfoot are flattened. The ligule is white, blunt, and fairly long. It has no ears, as has old-man twitch. One important characteristic is the swollen nature of the stems just below ground level. When the plants are small the leaves are frequently somewhat twisted. When in doubt, this is a useful check.

Creeping Bent (*agrostis stolonifera var compacta*).—Creeping bent grass is closely allied to browntop, but because of their different fertility and moisture requirements they are seldom associated in pastures. Creeping bent is common throughout the country, but because of its rather exacting requirements occupies only a very small amount of country compared with that occupied by browntop.

It is a prostrate perennial grass which spreads by means of stolons, and is very shallow rooted. It will grow on soils of fairly low fertility, but requires an abundant supply of moisture near the surface. It will stand a certain amount of flooding, but not quite as much as knee-jointed foxtail, with which it is frequently associated in the drier parts of damp pastures.

Fig. 27.—**On high fertility and swampy country tall fescue may ultimately take charge, ruining good dairying land.**

[*S. H. Saxby, photo*

An Indication

The presence of creeping bent over large areas, especially when associated with knee-jointed foxtail, indicates that the pasture could profitably contain a high percentage of meadow foxtail.

Creeping bent is low in leaf production compared with other plants which grow in the same habitat. The herbage, however, is eaten readily by all classes of stock. As a pasture grass it can be grouped with the many other plants which, while producing feed, really indicate that something better can be grown in their place.

Under one condition creeping bent is quite valuable, and that is on somewhat saline country above high-water mark on coastal inlets, where it produces a fair amount of feed in combination with a number of comparatively useless plants.

The chief distinguishing characters of creeping bent are its long, creeping, overground stems which root at the nodes, and the long white ligule. Ears are absent. The trailing stems are usually of a reddish colour. The sheath is round in section.

Yorkshire Fog (*holcus lanatus*).—This is one of the most maligned of our common grasses. It is a perennial, and produces a good quantity of herbage which, because of its hairiness, especially when conditions are dry, is not relished by stock.

Although it produces its maximum amount on heavy soils, it will grow under a very wide range of fertility, moisture, and climatic conditions. On first and second-class, well-drained, and stabilised country, Yorkshire fog is rightly regarded as a weed, as much better grasses can be grown. There are, however, two conditions under which Yorkshire fog is a valuable grass. Firstly, in the grassing of drained peat swamps Yorkshire fog is of great importance as a pioneer. One of the first essentials in the bringing-in of this type of country is consolidation.

A Pioneer Grass

Drained peat swamps, although overlying water, are dry and spongy on the surface, and fog is one of the few grasses that will establish readily on this soil. Its value here is not in the feed it produces, but in the binding effect of its rapid mat-forming habit.

Fig. 26.—**Yorkshire fog is one of the few grasses that will establish readily on drained peat swamp. Although usually regarded as a poor grass, it is of great value under these conditions as a pioneer in association with *lotus major*.**

[*S. H. Saxby, photo*

This permits cattle to be run on the country, with a consequent increase in consolidation and fertility. As the consolidation proceeds the introduction of better grasses is possible. Up to this time, however, Yorkshire fog plays an important part as a pioneer grass.

Secondly, there is a great deal of poor country on which Yorkshire fog occurs more or less naturally. On poor hills which have a fair rainfall Yorkshire fog is a prominent constituent of the sward, especially on the back-lying faces. Although not high in production, it contributes a considerable amount to a low-yielding sward that will not carry grasses such as cocksfoot, which requires a higher fertility standard than does Yorkshire fog.

Yorkshire fog may be recognised by its velvety, dull green leaves and the pink veins on the lower part of the leaf stem just about ground level. The ligule is small, but is distinct and hairy. There are no ears, and the stem and leaf shoot are round in section.

One of the Worst Weeds

Tall Fescue (*festuca arundinacea*).—This is one of the worst weeds of high fertility swamp country. It is an erect, tall-growing perennial grass which grows freely and spreads rapidly from seed unless kept under control. It is a very poor-quality grass, and although eaten to a certain extent by cattle, affords little more than a starvation or maintenance diet. In some districts tall fescue has taken charge of potential first-class dairying country which, in its present state of fescue dominance, is scarcely fit to carry dry stock.

In order to bring this land into useful production the complete eradication of the tall fescue is necessary, the best method of which is briefly as follows:—

(1) Destroy the existing plants by burning and grubbing out the roots or by ploughing right under with a swamp plough and chain.

(2) Because of the large number of viable seeds on the top of the soil, the germination and destruction of these is necessary. This may be carried out by the sowing of annual crops, such as oats, turnips, mangolds, or temporary pasture. Cultivation at all times should not be deep, as this will bring up old plants and seeds, neither of which will grow if kept buried.

(3) The sowing down and establishment of a suitable high-producing and dense permanent sward.

(4) After the establishment of the pasture grazing should be carried out by both sheep and cattle in order to keep down all growth, including young fescue plants.

(5) The eradication of any odd plants by hand.

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Fig. 28.—**Red tussock thrives in low-lying and sour situations. It was at one time common on the Southland plain, but with ploughing, draining and liming has been largely replaced by high-producing pastures.**

[S. H. Saxby, photo

Danger to Stock

In addition to being practically valueless for fodder, tall fescue causes serious derangements in stock during the summer months. In the mature condition tall fescue is not difficult to recognise because of its erect, tussock growth and dark, shiny green leaves. The leaves are fairly broad, and are serrated on the edges. These serrations, or saw edges, give it a very harsh feel, and if the leaves are grasped firmly and drawn through the hands these serrations are liable to cause light scratches.

In the young stages tall fescue is very similar to meadow fescue and Italian ryegrass, and there is considerable difficulty in differentiating these three grasses. This is discussed under meadow fescue. Tall fescue is a deep-rooted perennial plant. The sheath is round in section, and the leaf shoot is rolled. The ligule is small and blunt. Ears are very small.

Native Tussock

Red Tussock (*Danthonia raoulii*).—This is one of the largest of the native tussock grasses, and occurs in scattered localities throughout the country. The habitat in which it thrives is one of wet, sour, and cold conditions, and was formerly the dominant grass on the lower tall tussock grasslands, being particularly abundant on the Southland plains. The conditions under which it will thrive are just too wet and sour for ryegrass to thrive.

The chief value of red tussock is the fact that it indicates very well that the country on which it is present will, with liming, draining, and topdressing, maintain pastures from the ryegrass, cocksfoot, white clover type to the ryegrass, timothy, foxtail type. As a pasture grass it is of little value except as an indication of the foregoing conditions. Red tussock is eaten by stock only as a last resort, and can be regarded as a "starvation" diet only. In Southland it has on some occasions proved valuable in this respect.

(To be continued.)

Growing Plants Without Soil

Methods Still Under Trial As Practical Systems of Crop Production

F. SYDENHAM, Assistant Horticulturist, Wellington.

THE growing of plants without soil no doubt finds its origin in the culture of plants in experimental solutions under laboratory conditions. In this way much about the nutrition of plants has been discovered. The growing of plants in nutrient solutions other than by research workers, however, is comparatively recent. That it is possible to do so has been brought to the notice of the public by the Press, cinema, scientific literature, propaganda, and advertisements. It is described under various names, such as "Water Culture," "Tank Farming," "Soilless Agriculture" and "Hydroponics."

The number of inquiries seeking advice as to how to grow plants by this method has prompted the writer to prepare this article. It is not written as the result of local experiment or experience, and much of the information has been gleaned from literature. It is not a recommendation, but is given merely to supply information on a subject about which there is much inquiry.

The growing of plants in soil is recognised as being natural. How different is it from growing them in solutions? The soil consists of weathered particles of rock and of organic material in various stages of decomposition. It is moist, and the moisture carries in solution form the mineral elements recognised by the plant. The solid portion supplies anchorage for the roots so that the plants have a foundation from which they can spread their branches and leaves into the air.

If this account of the soil is considered in relation to the methods described later it will be seen how closely water culture resembles the natural method.

Different Methods

While it is the composition of the solution which is the important consideration in growing plants by this method, there are different ways of supporting the plant and of giving the necessary aeration to the roots.

This article has been written as a result of the numerous inquiries received on the growing of plants without soil. It is not intended that it should be taken as a complete guide to "soilless gardening," and it is pointed out that hasty conclusions should not be drawn, as these methods of culture are still in their infancy.

(a) Sand Method

In the sand method the plants are grown in sand in containers in which drainage is provided and to which the nutrient solutions are applied. Sand does not hold the water and quickly dries out, so that it is necessary to water it frequently. Arrangements may be designed whereby the water drips on to the sand from one container and is collected by another, the solution being used over and over again.

The sand must be quartz sand, and free from lime and chemicals which would affect the solution. It must not be so fine that the solution does not percolate through it, nor must it be so coarse that the solution flows through it too readily.

(b) Sub-irrigation

Under the sub-irrigation method the plants are grown in much the same manner as mentioned, but on a larger scale, in shallow tanks containing coarse sand or similar material. The tanks are flooded and allowed to drain, and this is repeated throughout the day. The period when the solution has drained away and before re-flooding, which may be several hours, gives the roots the aeration they require.

The root system of plants grown in solution in a tank.

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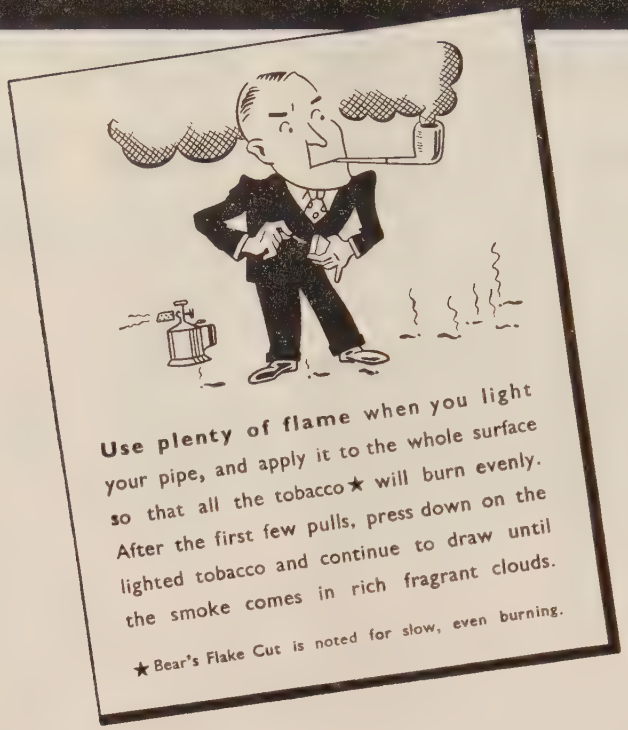

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(c) Culture Solution

Various techniques for culture solution have been evolved. It is not natural for plants other than water plants to grow in water, and for this reason the water must be aerated or the roots exposed to the air for a few minutes each day. The solution may be still, or it may flow from a reservoir into the container and the overflow collected and run through again.

Water in itself does not offer the necessary support to the plants. It may be given by a method as shown in the illustration. Here the plant is supported in a painted wire-netting basket containing some fibrous material, such as woodwool or moss. A space is seen between the basket and the solution. This space, the literature would suggest, is necessary for partial aeration of the roots, and is smaller when the roots are small.

Strangely enough, plants grown by this method and also by the previous methods have to be watered with tap water. The solution used rises up on the outside of the roots and stems and evaporates, leaving a concentration of the salts, which injures the surface tissues (2). Periodic washing with water dissolves this film.

Rooting Systems

The rooting systems in water culture are likely to be small, as the roots do not need to travel great distances in searching for food. They do not need to grow to great size to give support to the plant. Any containers may be used, whether wood, glass, earthenware, metal, or concrete. Because of chemical substances which they might contain and which might be dangerous to plants, it is recommended that they be painted. Paints must not be oily or contain lead, and pure bitumen or asphalt paints are recommended. (1).

When growing tuberous crops, such as potatoes, the fibre bedding must be 6 in. to 8 in. deep, and the tubers are produced in this bedding. The roots must be aerated. This may be done by pumping air for a few minutes each day through the solution, or by lifting the plants out of the solution so that the roots are exposed for a few minutes.

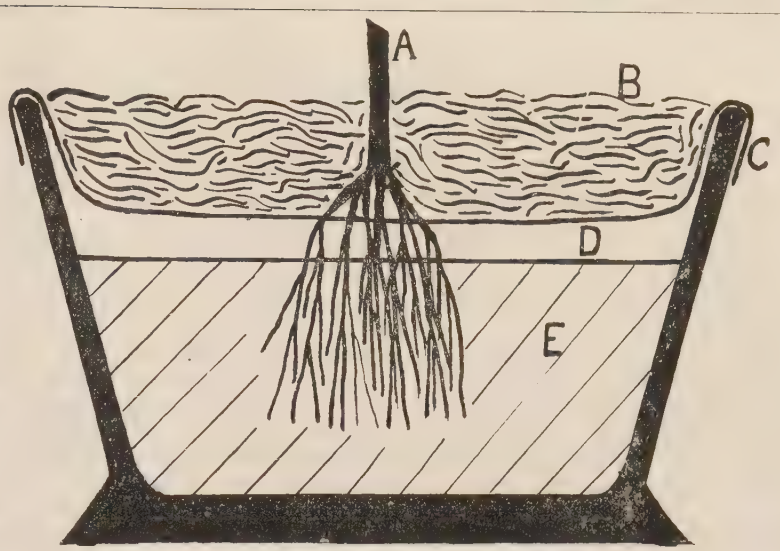

Diagram showing the method of growing plants in solution—A, plant stem; B, supporting medium; C, wire-netting; D, air space; E, solution.

Nutrient Solutions

The important consideration in soilless gardening is the composition of the nutrient solution. One author (1) claims that in a certain domestic water supply the content of plant food is sufficient to produce an abundant growth of a certain crop without the addition of any chemicals. This is unusual, and he maintains that it is fairly safe to grow any plant in any solution he records in his book.

The plant requires certain minerals in relatively large quantities. These are spoken of as the "fertilising chemicals," and must not be confused with the elements required in very small amount, the "trace elements." The fertilising elements may be doubled in concentration without much harm. In fact, where the plant shows too weak a growth it may be hardened by increasing the concentration of the fertilising elements.

The trace elements must be kept at a very low concentration as recommended in the formulae or the plant will suffer. The absence or overabundance may equally cause untold harm.

Preparation of Solutions

(a) **Stock Solution of Trace Elements.**—These solutions are recommended by Ellis and Swaney (2).

SOLUTION A.

In ½ gallon of tap water dissolve 3.2 grammes (one level teaspoonful) of each of boric acid, manganese sulphate, and zinc sulphate, and to this add 0.4 gramme (1-8 teaspoonful) of copper sulphate if desired.

SOLUTION B.

In one pint of tap water dissolve 0.8 gramme (¼ teaspoonful) of ferric chloride or ferric nitrate. As the iron is inclined to precipitate when introduced into the culture solution, it is not used until the culture solution is made up for the plants.

(b) **Stock Solution of Fertilising Elements.**—A great number of different formulae are suggested. Only two are given, the second using ordinary fertilisers.

FORMULA 1.

	Grammes.	Level Standard teaspoons.
Monopotassium phosphate	5.9	1¼
Calcium nitrate	20.1	4
Magnesium sulphate ..	10.7	2½
Ammonium sulphate ..	1.8	½

FORMULA 2.

Superphosphate ..	5.8	2
Nitrate of soda	6.4	1
Magnesium sulphate (epsom salts) ..	10.3	2½
Potassium chloride (muriate of potash)	3.9	1

(Note: The various ingredients are of different weight which explains the dissimilarity between weight and measure).

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Each ingredient in either formula is dissolved separately and mixed. These amounts are for five gallons of culture solution. Before using, however, the trace elements are added. Of Solution A, 10 ccs. (two teaspoons) are added to each five gallons. Of Solution B, 20 ccs. (four teaspoons) are added to each gallon. Formula 2 (using impure fertilisers) requires only half of the trace elements as these elements are contained in the fertilisers.

The life of the solutions depends on many circumstances. The smaller the quantity the more frequently it will need changing, possibly once a week. Solutions of 25 gallons may require changing every four to six weeks.

Alternatives

Unfortunately, a few of these ingredients are not obtainable in New Zealand. Manganese sulphate is one. Manganese chloride is obtainable from most chemists or chemical dealers, and might give the same result. If difficulty is experienced in procuring this compound a trial with potassium permanganate (Condy's crystals) in the same proportion as the manganese sulphate in solution "A" might obviate the difficulty. The use of this compound is not a recommendation, merely a suggestion.

Ferric chloride is not available in powder form, as it takes up water very readily. It is sold by chemists as a 15 per cent. solution, in which 0.8 gramme is contained in 5.3 ccs. (or approximately one teaspoonful).

Cost of Ingredients

The cost of the ingredients is very small. A shilling or two spent on the trace elements should supply sufficient for hundreds of gallons of culture solution. The cost of the fertilising elements, and especially those in Formula 2, is almost insignificant.

Conclusion

There are, no doubt, instances where the soilless growing of plants is of importance. Caution, however, must be exercised. Various claims are made by enthusiasts and firms of the phenomenal crops that are produced, but no mention is made of the cost of equipment. It is suggested that there will be no soil-borne diseases, but no mention is made of the possibility that there may be a host of deficiency diseases.

A summary of the work at the English research station at Jealots Hill (3) and reproduced here gives the opinion of unbiased and commercially uninterested research workers. . . . "These methods, as practical systems of crop production, are still in their infancy, and hasty conclusions should not be drawn. When sufficient experimental evidence has been accumulated, nutrient solution methods will no doubt be of great interest to the amateur and for specialised purposes and later, possibly, to the commercial grower."

Summary of Details

For those who desire to try out the method, the following notes are given:—

(1) Prepare containers as described on page 413.

(2) Grow seedlings in soil, or on sand as in the sand method.

(3) Transplant into container to be used. If seedlings are grown in soil, this must be washed off and the roots lowered into the solution. If the plants are to be grown by the sand method transplant from sand in the usual way.

(4) Attend to aeration of plant roots and/or solution.

(5) Maintain the level of water in the container by adding tap water to replace the water that evaporates or is transpired.

(6) Occasionally add additional chemical solution.

(7) Change the solution as required. The plants must be watched, and when they show signs of unbalance fresh solution must be used.

(8) Do not allow light to get into containers. It encourages growths of algae.

References

(1) Dawson and Dorn—"Plant Chemiculture."

(2) Ellis and Swaney—"Soilless Growth of Plants."

(3) Templeman and Watson—"Journal of the Ministry of Agriculture," Vol. 45, No. 8.

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Pig Census Returns

Amounts of Meal Used

M. J. SCOTT, Superintendent of the Pig Industry, Wellington.

THE census returns from 267 farms all over New Zealand are now available for the second year ended May 31, 1939. The information collected is examined from the standpoint of amounts of meal used and the profitability of using different amounts of meal at a price for pig-meal and at three different prices for meal.

Farms are grouped as follows:—

A. Those on which the meal used is less than 5 per cent. of all the feed used. (92 farms)

B. Those on which the meal used is between 5 and 10 per cent. of feed. (74 farms)

C. Those on which the meal used is between 10 and 20 per cent. (70 farms)

D. Those on which the meal used is more than 20 per cent. of all the feed used. (31 farms)

As was the case last year, the best return for skim-milk is obtained when meal is used at the rate of approximately 1cwt. for every cow milked (with pig-meat at 5½d. per lb.), even though meal is £14 per ton.

This is not the result of any theorising. It is the average result obtained by 70 farmers who use meal in this way. Their return for pigs, after paying for meal used, is 4/7 per cow better than the return obtained when meal is used for pig-feed at the rate of 16lb. per cow milked, and slightly better than where only 45lb. per cow are used. Those whose use 5cwt. meal per cow milked reduce their profits below the level of those who use no meal or only a little meal.

Meal Prices

The question of meal prices assumes a new importance with the change in weight of pigs that may be expected. For this reason it may be worth while to consider more critically the returns stated above.

Most farmers protest that meal prices are too high—at the present price of pig meat meal prices are nearly twice as high as meal prices in Great Britain —but there are very few who have specific evidence of how the prices of meal influence the cash returns for dairy by-products. There are so many slips between £10 paid for meals at the beginning of the season and £10 of increased output that it is quite impossible for anyone to say what part the meal played in profits or losses. An unusual milk shortage or heavy mortality in pigs could quite easily destroy all the profits of using meal, while in another year abundant milk, used wastefully, gives more profit than was ever expected from a combination of all the best practices and a lesser milk supply.

In the accompanying table there are set out the values of skim-milk per cow (500 gallons) when this is fed to pigs with meal in different proportions (the average amounts used by farmers who supplied census information), and when the meal costs are £14 or £9 or £6 per ton. Pig meat is taken at 5½d. per lb. The returns per cow are gross, less the cost of meal bought. No account is taken of labour and overhead costs.

	Nett return per cow when meal costs per ton are:—		
	£14	£9	£6
A.—Meal used for pig feed at the rate of 16lb. per cow	30/10	31/3	32/1
B.— ,, ,, ,, ,, 45lb. per cow	35/–	36/8	38/–
C.— ,, ,, ,, ,, 1 cwt per cow ..	35/5	39/2	41/8
D.— ,, ,, ,, ,, 2½ cwt. per cow ..	21/8	40/5	52/1

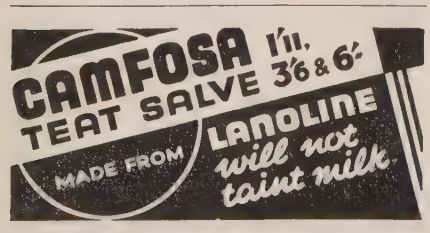
Repays Study

This table repays careful study by those who treat the meal position as a business. It will be seen that the price of meal does not matter at all when only a little is used, but when used at the rate of 1cwt. per cow milked, a reduction in the price of meal pays good dividends.

Pig-keepers could with advantage set out to persuade the organised industry to give consideration to trebling the meal consumption at a price near £9 per ton. It would improve the profits from pigs by 20 per cent., and increase the number of pigs by about only 10 to 12 per cent.

The most striking feature of the table is the increase in the earning value of skim milk as the proportion of meal increases, with only one exception.

Where meals of pollard, barley, or other grain quality can be used for £9 or £6 per ton, the greater the amount that is used up to 5cwt. per cow milked, the greater the profit. Where meals cost £14 per ton, the upper limit of profitability is reached apparently when 1cwt. of meal is used per cow milked; that is, 1lb of grain to five gallons of milk.



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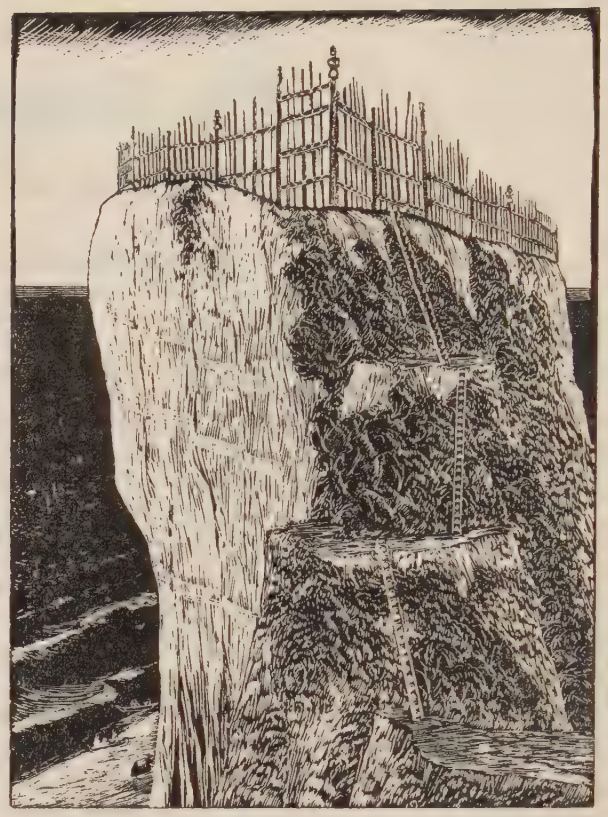

A Maori Fort in Taranaki, in 1839, showing its isolated and impregnable position. *(A scraper board drawing from "Making New Zealand," Pictorial Survey, No. 2, "The Maori.")*

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Harvesting Strawberry Clover Seed

Methods Adopted by Hawke's Bay Farmers

-By-

R. P. HILL,

Fields Instructor, Hastings.

A close-up of a ten-acre field of strawberry clover. There is a dense mat of flower heads, but all are in varying stages of maturity.

IN VIEW of the great value of strawberry clover as a pioneer clover for the reclamation of tidal areas, its ability to thrive under salty conditions, and its great drought-resisting properties, it is not surprising that farmers are concerned at their inability to purchase the seed and at a reasonable price.

Insufficient quantities of this seed are harvested locally to meet New Zealand requirements, and it is frequently necessary to import seed from Australia. The retail price has been about 4s 6d per lb. for the past few years.

A certain amount is harvested in Canterbury, where harvesting conditions are good, and recently in Hawke's Bay, where harvesting conditions are equally good, several farmers have harvested their areas of strawberry clover for seed purposes.

Difficulties

The harvesting of this clover presents many difficulties. The seed is difficult to extract from the pod, and the growing and seeding stage of the plant is very prolonged. It begins seeding in December, and continues throwing up seed heads until the end of April. It is therefore, unwise to close up paddocks too early. Rather is it better to graze with stock until dry weather sets in and no further growth is probable from the other clovers and grasses which are associated in the paddock with the strawberry clover which, with its deep rooting system, is capable of producing leaf and flower under very dry conditions.

High prices rule for strawberry clover seed, of which insufficient quantities are harvested locally for New Zealand requirements. The harvesting of the seed presents many difficulties, but several farmers in Hawke's Bay have recently harvested areas for seed purposes, and the procedure followed in that district is described in this article.

On the farms under review the strawberry clover was growing on land which, many years ago, had been salty, and fortunately the competition from other species was not great. The ryegrass had already seeded, but some trouble was experienced with white clover and English trefoil.

Two Methods

Two different methods were adopted in the harvesting. In one case the paddock was mown for hay in February—unfortunately rather too early to obtain the maximum ripened seed—and the hay was allowed to remain in the swathe for five weeks before stacking. After about a week in the stack the hay was put through a clover huller. Much of the seed, not being ripe, remained in the hay, and only 200 lb. of mixed strawberry clover, English trefoil, and white clover seed per acre was obtained. This was later machine-dressed, and resulted in a yield of approximately 100 lb. of

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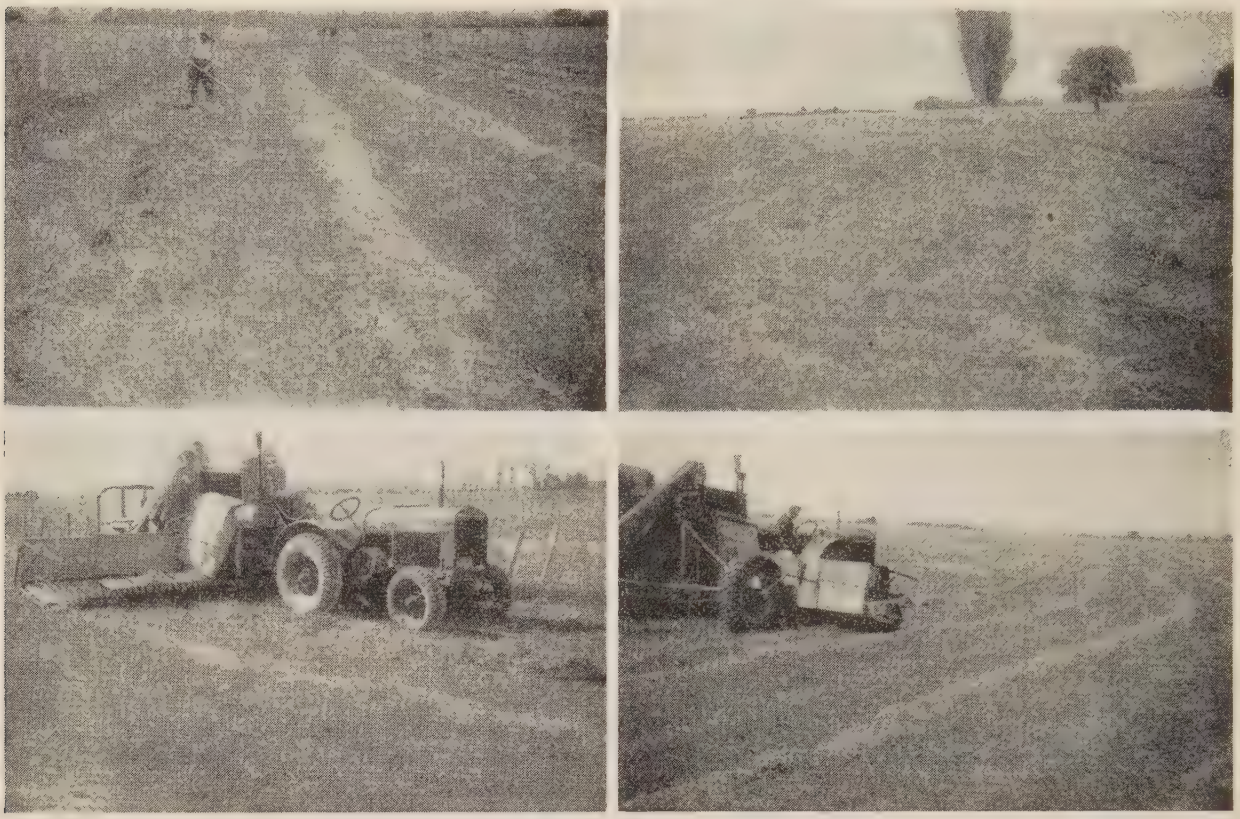

Top—*Left:* Hand-raking into windrows. Because of the shortness of the stalk a power rake is useless. *Right:* Strawberry clover raked into small windrows ready for the mill. It is left in the field for at least a month. Bottom—*Left:* The type of "pick-up" employed. *Right:* Mill- threshing strawberry clover from the swathe.

strawberry clover seed per acre. However, to obtain this yield the seed had to be put through the machines several times to eliminate the white clover, and the costs were necessarily high.

On the second farm the paddock was closed up after Christmas. The weather remained dry, and it was not mown until late in February. It was left in the swathe for a month and then hand-raked into narrow windrows, where it was allowed to remain for a further two weeks. It was then threshed by a "pick-up" mill, and the crop again yielded approximately 200 lb. of mixed clover seeds to the acre, approximately half white and half strawberry. This was also machine-dressed and reduced to about 100 lb. of strawberry clover.

It is difficult to advise which procedure is the most satisfactory, as a great deal depends on the weather. Strawberry clover seed is very slow in ripening, and, if left in the swathe, requires dry, hot weather, which is also

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Left: **Threshing strawberry clover into a clover huller. The threshed straw is often stacked and threshed again later.**
Right: **Threshing into a clover huller.**

necessary to make the seed thresh out of the pods.

The ideal time to harvest with the "pick-up" mill is in the hot sunlight immediately the dew has evaporated. Unfortunately, this mill is not able to pick up anything like all the seed. The stalks are short, ranging from about 9 inches down to 3 inches in length, and until some means is devised whereby all the seed heads may be harvested much of the crop will be left in the field.

When the crop is stacked a method sometimes employed is to thresh after a short period in the stack, then stack again and leave for a year, when the straw is again threshed. By this means it is claimed that more seed ripens and, as the pod softens, greater yields are obtained.

Strawberry clover and white clover seeds are much the same size, and, as there is generally much of the white clover present in the dressing, costs are heavy.

It will readily be seen that the saving of this crop is not a simple matter, and this no doubt is the principal reason why the seed is so scarce and the price high.

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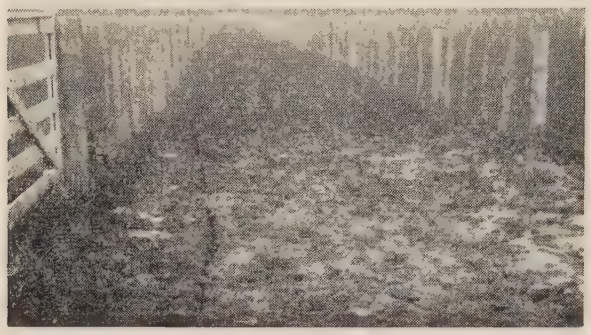
Avoiding Mud and Dust in the Cow Race

By
E. R. MARRYATT,
Fields Instructor, Animal Research Station, Ruakura.



MOST COW RACES ARE LIKE THIS IN THE WINTER

This race is only 15ft. wide, but is used by only 12 cows. Wide races are better than narrow races, but they do not eliminate mud, and they make more ground unproductive.

In most cases the amount of mud depends mainly on the soil type, whether this be natural or man-made. The more clayey the soil and the poorer the drainage, the more muddy becomes the race in wet weather.

A well-drained soil which is sandy or gravelly is, of course, much less likely to become a mire. The race which is muddy in wet weather is usually

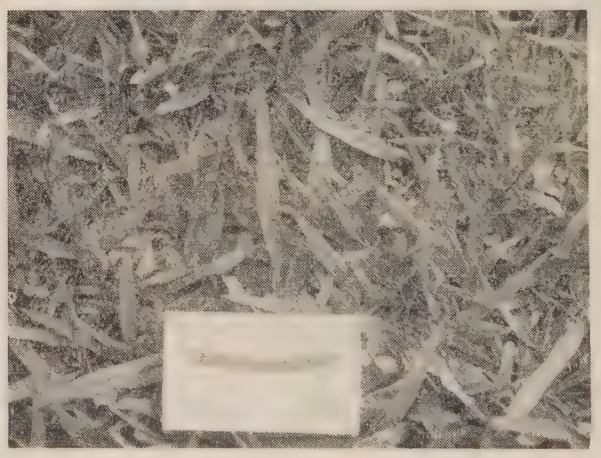
DUSTY IN DRY WEATHER.

Every farmer is willing to go to some trouble to endeavour to reduce the mud and dust. The usual method is to spread sand or shingle in the race. On the feed-flavour farm at Ruakura we are trying to establish paspalum in the race. Our aim is to change the condition of the race from what it is in the first two illustrations

TO THIS—

The following illustration is a close-up showing the density of a good paspalum turf. If this kind of ground cover can be obtained in a cow-race,

MUD AND DUST WILL BE MERE MEMORIES—



We have not yet obtained this desirable condition, and there is no certainty that we ever will obtain it, but the chance of failure is worth risking, as there is nothing to lose, and little trouble or expense is involved.

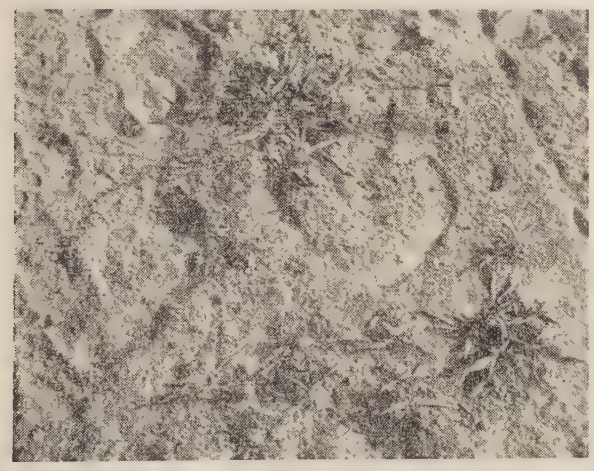
Two methods of establishing paspalum are on trial. We have sown seed, and have also planted turfs. The seed was surface-sown at the rate of 60 lb. to the acre on December 2, 1938. Paspalum seed requires a very warm soil for germination.

No cultivation was given to the race either before or after sowing, as the hoof-cultivation from the regular movement of the cows was considered to be sufficient. The seeding is a heavy one, but the germination capacity of paspalum seed is usually very low, and further, many germinated seeds are likely to be killed by the hoofs of the cows disturbing them before they can become securely rooted.

Inside the circle in the second illustration is a young, but isolated, paspalum plant establishing from seed.

That is our worst establishment.

HERE IS OUR BEST as at March 7, 1939—



At the same time as the seed was sown, 20 turfs 12in. by 12in. and 3in. to 4in. deep were taken from a sward similar to that in the third and fourth illustrations and systematically transplanted in the race. The system was adopted for experimental purposes only, and does not require description.

These turfs had re-established themselves perfectly by March 7, 1939, as can be seen by this example, and they now show

SIGNS OF SPREADING—

Although some years will elapse before a close turf can be obtained by this method, each year should see an improvement in the mud and dust nuisance. Should any farmer consider trying this scheme himself, he is advised to sow paspalum seed either in late November or December. The transplanting of paspalum turfs will probably be successful at any time of the year except in the winter or in a very dry part of the summer.

Some farmers may have areas of sod-bound paspalum which they wish to rejuvenate. The turf from these areas could well be completely transplanted in large sections to the wetter portions of the race, and the soil left exposed after their removal could then be more easily cultivated and re-sown with a grass-seeds mixture.

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North Taranaki Pasture Competitions

Important Factor In Further Development Of Pasture Production

Mr. B. F. Jury's (Tikorangi) champion open class pasture, 1938-39.

Mr. A. Wood's (Omata) champion dairy class pasture, 1938-39.

—By—
C. J. HAMBLYN,
Fields Superintendent
Palmerston North

SO great has been the development during the past seven or eight years of the pasture competitions in North Taranaki that this season some 666 pastures, totalling more than 4000 acres, were judged on 400-odd farms. It is certain that in no other district in New Zealand is attention being so profitably focused on the local problems of grassland farming.

To those responsible for the organisation of the competitions, the Provincial Executive of the Farmers' Union, the Agricultural and Pastoral Association, and the many branches of the Farmers' Union throughout the district, the intense interest created by these pasture competitions and the excellent educational results being achieved must be a fitting reward for their efforts.

An Instructor in Agriculture does the judging and leads the discussions both on the farms and at the many special evening meetings which follow the day's judging at various centres, and although the competitions entail much travelling and long hours in the field, it is most interesting work and gives him a very close contact with a large number of farmers in his district and an intimate knowledge of their grassland problems.

Problems Discussed

To those farmers entering pastures for one or other of the competitions an opportunity is offered during the judging of not only of discussing pastures with the judge, but also of visiting other farms and discussing with other farmers the many problems of establishment, weed control, topdressing, management, and utilisation of pastures which arise from farm to farm. That education is an important aspect of the competitions is shown by the number of farmers who make the rounds of each district with the judge and the keenness of the discussions at the evening meetings, which are also well attended.

Since 1936 rapid progress has been made, not only in the number of districts taking part and in the number of competitors, but more particularly in the interest being aroused and in the actual results in pasture improvement being achieved.

Three Classes

The competitions are divided into three classes:—

(1) Dairy Class.—Open to pastures of three acres and at least three years old and grazed by dairy stock only.

(2) Open Class.—With the same minimum area and age and grazed by dairy stock plus other stock, as sheep or pigs, or by sheep and dry stock.

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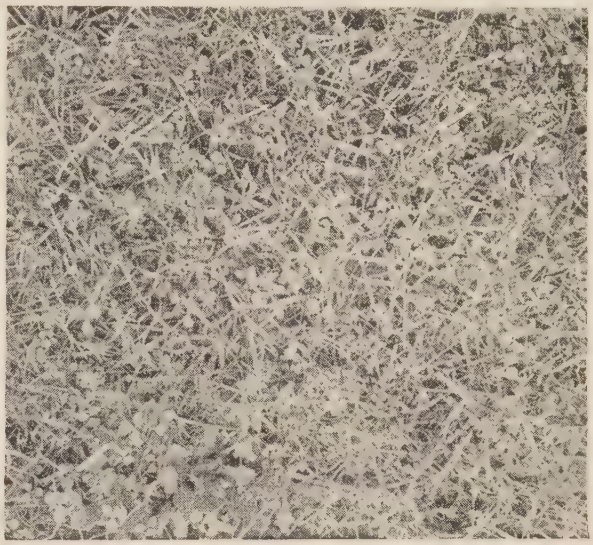
Before.—The original turf of Mr. G. E. Liddall's pasture. [*H. Drake, Photo.*



After.—The same turf—but improved by regular harrowing, topdressing and systematic stocking—which won the improvement class championship. [*H. Drake, Photo.*

(3) **Improvement Class.**—In which any entry from either the dairy or open classes is judged for the second year in succession, and the award is made on the amount of improvement effected during the year without ploughing.

The entries are made in the early spring of each year, and judging is carried out in October and November, and again in March and April. District competitions organised by the

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local branch of the Farmers' Union are combined into championship competitions, organised by the Central Competition Committee, in which all districts take part.

Leaders in the spring and autumn judgings—that is, those pastures with a chance in one or other of the championship classes—are inspected without notice in mid-summer and again finally in midwinter, the points scored over the whole year being counted in awarding the championships. In this way little is left to chance, and pastures have to be very well managed throughout the year to maintain a uniformly high place.

Most Benefit

While the dairy and open classes have a distinct value in demonstrating what can be done in developing and maintaining excellent pastures under various soil and climatic conditions, it is to the improvement class that the organisers look for most real benefit to the farmers as a whole. In this class the idea is to enter a pasture which has plenty of room for improvement and, after it is judged in the first year, to effect improvements which will enable it to score much higher points the following year.

This class caters for those farmers with more difficult conditions and backward pastures, and has served to focus attention on certain practices which can be cheaply and effectively put into operation to effect a considerable improvement in the production from pastures. Among those practices which have given excellent results, that of severe harrowing in the autumn or early spring to prepare a seed bed for additional species, such as certified perennial ryegrass and good type certified white clover, has found most favour, particularly where these species were lacking.

Where the poor pasture was a matter of neglect and low fertility but the desired species were there, excellent results have been obtained by frequent harrowing to spread droppings, feeding out good quality hay, heavier top-dressing, and particularly the use of cowyard manure spread in liquid form. Good management, especially systematic grazing and spelling, has also done much to improve weak and open swards.

Results

The results of the competitions for the past three seasons, in which there were 666 entries in 1938-39, 572 entries in 1937-38, and 449 entries in 1936-37, are as follow:—

(1) **Dairy Class Championship and I.C.I. Cup.**—1938-39. A. Wood, Omata, 1; J. J. Carey, Okato, and A. Wood, Omata, 2, equal. 1937-38: W. J. Freeth, Urenui, 1; J. J. Carey, Okato, 2. 1936-37: V. Evans, Urenui, 1; S. Topless, Urenui, 2.

(2) **Open Class.**—1938-39: B. F. Jury, Tikorangi, 1; H. A. Foreman, Tikorangi, 2. 1937-38: R. Cassie, Okato, 1; Piri Piri Estate, Awakino, 2. 1936-37: W. J. Bridgeman Okato, 1; G. F. Merhtens, Inglewood, 2.

(3) **Improvement Class.**—1938-39: G. E. Liddall, Waitoitoi, 1; J. Shepherd, Ratapiko, 2. 1937-38: L. M. Penwarden, Omata, 1; J. W. Budden and R. W. Giddy, Huirangi, and R. Phillips,

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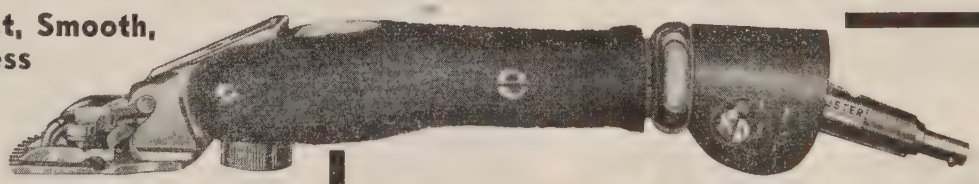

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Before.—The original turf on Mr. J. Shepherd's pasture.

[*H. Drake, Photo.*

After.—The improved turf—obtained by drastic harrowing and surface-sowing of ryegrass and white clover—which gained second place in the improvement class.

[*H. Drake, Photo.*

Inglewood, 2, equal. 1936-37: R. C. Watson, Inglewood, 1; S. R. Mounsey, Inglewood, 2.

Although very well supported, competitions have been run for many years in connection with hay and silage and also root crops in North Taranaki, it is certain that the pasture competitions, aimed as they are at the improvement of pastures, will give still better results. Improved pastures must mean better raw material for both hay and silage, and heavier stocking and increased fertility of farms must prepare the way for better crops.

To Mr. D. Le C. Morgan, secretary to the Provincial Executive of the Farmers' Union, and to the many branch secretaries of the union who organise the district competitions great credit is due for the work put into what is undoubtedly an important feature in the further development in pasture production in North Taranaki.

Subterranean Clover.

On cultivated land there seems to be a definite place for subterranean clover in light-rainfall districts or on poor soils where white clover is difficult to establish. An exception to this appears in Central Otago, where extreme dry and cold conditions prevail in winter.—*Annual report of the Director, Fields Division.*

Slaughterings of Stock

THE following return of slaughterings of stock at meat-export slaughterhouses and abattoirs for the five months, May-September, 1939, has been compiled by the Livestock Division:—

District	Cattle	Calves	Sheep	Of which Ewes were	Lambs	Swine
North Island						
Meat-export Slaughterhouses—						
Auckland	75,671	451,319	34,512	17,174	75,004	43,414
Poverty Bay-Hawke's Bay	19,991	48,015	87,522	23,859	131,442	6,306
Taranaki-Manawatu	45,092	179,779	55,899	27,113	167,004	29,792
Wairarapa-Well'ngton	15,364	17,788	33,095	14,009	69,713	5,494
Totals	156,118	696,901	211,028	82,155	443,163	85,006
Abattoirs	52,681	17,487	205,477	106,482	14,238	38,444
North Island Totals	208,799	714,388	416,505	188,637	457,401	123,450
South Island						
Meat-export Slaughterhouses—						
Nelson-Marlborough	597	7,132	5,433	2,114	23,420	1,915
Canterbury	5,144	27,033	147,769	107,847	435,724	10,659
Otago-Southland	3,079	21,928	62,073	39,721	572,442	1,801
Totals	8,820	56,093	215,275	149,682	1,031,586	14,375
Abattoirs	24,692	5,163	119,992	58,938	10,086	12,606
South Island Totals	33,512	61,256	335,267	208,620	1,041,672	26,981
Dominion						
Meat-expt. Slaughterhouses	164,938	752,994	426,303	231,837	1,474,749	99,381
Abattoirs	77,373	22,650	325,469	165,420	24,324	51,050
Grand Totals	242,311	775,644	751,772	397,257	1,499,073	150,431
Same Period, 1938: Meat-export Slaughterhouses and Abattoirs	222,468	759,576	866,251	507,761	1,331,487	209,147
Same Period, 1937: Meat-export Slaughterhouses and Abattoirs	237,172	787,336	692,872	379,764	1,433,144	233,044

Asparagus—

Promising Future on Large Portion Of Ahuriri Lagoon

G. M. McINDOE, Orchard Instructor, Hastings.

Experimental results to date indicate that there is a promising future for asparagus on a considerable portion of the reclaimed Ahuriri Lagoon, Napier. The limiting factors are the height of the permanent water level and the presence of the nut-grass Scirpus robustus.

AS AN EFFECT of the earthquake of 1931, the tide receded from the Ahuriri Lagoon, leaving approximately seven thousand acres of land available for reclamation, and it was considered that the culture of asparagus on this area offered possibilities.

Photo Above—

A general view of the experimental asparagus plants.

As an experiment, an area of one acre was put under preliminary cultivation in March, 1937, and sown with Cape Barley, using 3 cwt. of superphosphate. The barley succeeded reasonably well, and was ploughed under in the following July. Preparation was then made for planting with asparagus.

Fertilisers Used

Prior to planting, 370lb. of muriate of potash and 185lb. of superphosphate was sown, and the planting was com-

A close-up of one of the rows, showing the vigorous growth at two years. The rows are 5ft. apart; the plants 18in. apart.

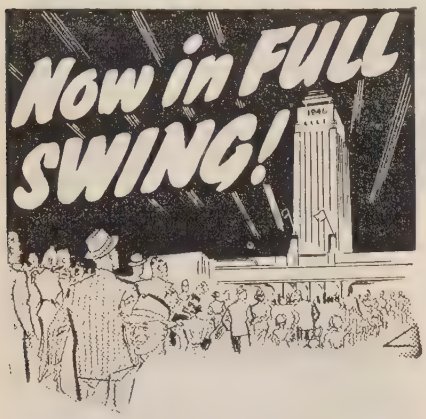
pleted on August 30, the varieties being Connover's Colossal and Mary Washington.

From September onwards frequent rain prevented weeding and cultivation, and while the waterlogged condition of the soil, with the heavy run-off of rain water, interfered with cultural operations, it was no doubt beneficial in carrying off appreciable quantities of salt. The resultant growth of weeds for a time made the venture appear to be a hopeless proposition, but when conditions favoured the resumption of cleaning and cultivating the outlook became distinctly promising.

Promising Future

The results to date would indicate that there is a promising future for asparagus on a considerable portion of the reclamation, the limiting factors being the height of the permanent water level and the presence of the nut-grass *Scirpus robustus*. *Scirpus robustus* is a deep-rooting sedge that springs from a nut or corm at the base of the stem, and its control entails the removal of all the nuts, which, if left in the ground, give rise to new stems. Consequently, where it has become established, the control or removal of this type of plant would not be an economic possibility.

The accompanying photographs, taken on March 14, 1939, give a fair indication of the growth to date. Cutting will be started next season.



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NOVEMBER, 1939——MAY, 1940

Importation Of Horses

BY the Stock Importation Amending Regulations, 1939, which amend the principal regulations made under the Stock Act 1908, governing the importation of stock into New Zealand, it is provided that horses from the United Kingdom may be permitted to land in the Dominion without being subjected to the Mallein Test on arrival if they are accompanied by the prescribed certificate of such a test, and if found on inspection to be free from disease.

In the scale of fees set out in the schedule to these regulations provision was made for payment of a fee for applying the Mallein Test to horses on arrival on the basis of £1 1s for one animal and 10s 6d for each additional animal the property of the same owner. As the Mallein Test could be dispensed with in the circumstances outlined above, horses arriving in such circumstances could land without payment of an inspection fee.

The purpose of the Stock Importation Amending Regulations 1939, No. 2, is to remedy this anomaly by providing that the inspection fee in respect of horses from the United Kingdom shall be £1 1s for one animal and 10s 6d for each additional animal the property of the same owner. If the Mallein Test is applied to such horses on their arrival in New Zealand the regulations prescribe a further charge of £1 1s for one animal and 10s 6d for each additional animal the property of the same owner.

—A. E. MORRISON, Legal Clerk.

Tobacco Notes

Cultivation of Tobacco Fields

ALL tobacco growers have been busy pricking out tobacco seedlings into nursery beds during October. The weather has been good for this work, and a healthy "take" of young plants is visible throughout the Nelson district.

Intensive cultivation of the tobacco fields should now be started so that the soil will be in a fine state of tilth to receive the young plants in November. If this cultivation by discing, rolling, and harrowing is done now it will facilitate the manuring.

It is recommended that the manure be sown in drills running north and south, 3ft. 10in. or 4ft. apart and at a depth of five to six inches, leaving the soil in a ridge ready for the planters to work upon. The manure should be applied at least a fortnight before the plants are set out so that it will be to some extent assimilated into the soil. There is a danger of burning the young roots if they come in contact with fresh manure at the time of planting.

Some growers cross-mark the paddock by dragging a frame set with pegs 20in. or 2ft. apart to indicate the exact spot on the ridge where the plant is to be set. An improvement on the "peg" method is to attach a short length of chain instead of the peg. This leaves a clear mark on undulating land, and does not collect rubbish.

—CHARLES LOWE, Tobacco Instructor, Motueka.

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Discussions on First-Aid Measures

Contributed by the Livestock Division

Accidental Poisonings of Stock

Salt Poisoning In Calves

THE indiscriminate and unnecessary use of licks, especially those containing a large percentage of salt, was brought under notice last spring. At the end of September the writer was asked to visit a farm where two calves had died and several were sick.

The calves were from six to nine weeks old. They were being well fed —all of them were still having a good ration of whole milk, and had access to a small paddock which had been closed during the winter and had a nice growth of prairie and other grasses. There was good shelter, and the yards and feeding utensils were clean and clean water was available. None of the calves looked well. Two or three of the worst had a very dejected appearance, with "staring" coats and a general unthrifty appearance.

Diarrhoea was present in the sick calves, and was almost white in colour (a very light putty shade). The droppings of the other calves were of the same colour, but firmer in consistency. Calves were noticed to be "off colour" for three or four days, and then went rapidly to pieces.

The dead calves had been disposed of, so that a post-mortem examination could not be made. There was no previous history of white scours, and the ages of the calves and character of the faeces did not suggest parasitic trouble, but rather some irritant as the cause of the illness. This surmise was correct, as, on looking about the feeding yard a nearly empty box containing a loose lick which was made up of a large amount of coarse salt was seen.

The owner was advised that unlimited salt was not suitable for young animals, and no more was allowed. Alterations in feeding were also recommended. Sack covers were provided for the weakest calves, and these were also placed in a clean-bedded shed at night. The surroundings were thoroughly cleaned up. One of these animals died, but the remainder made a rapid and uninterrupted recovery.

A few days later the writer visited another farmer who had lost a few calves and had many sick ones. This man also treated his calves well, and the similarity of the symptoms shown to those seen a few days previously was apparent. One calf was dead and another in a state of collapse.

The history was identical with that supplied in the first cases, and the owner seemed very surprised when asked to show the lick to which the calves had had access. An almost empty box of the same lick was found at the side of the shed.

A post-mortem on the dead calf and the dying calf after death showed acute inflammation of the fourth stomach and the small intestine.

Reports on accidental salt poisoning are rare. The condition may, however, be produced experimentally by drenching with large quantities of salt. Small quantities fed to calves might not be noticeably harmful, but where it is a "free issue" it is undoubtedly poisonous, particularly to those animals that appreciate it.

Probably many other farmers have had similar losses, but have not connected the salt lick with the trouble.

Arsenical Poisoning

MANY farmers apparently do not appreciate the poisonous properties of arsenical preparations such as dip, weed-killers, foot-rot preparations, etc. During the past 12 months the writer was called to three separate farms where animals had died suddenly and where post-mortem and other evidence pointed clearly to the deaths being caused by the animals consuming a quantity of arsenic from foot-rot baths, etc.

A farm was visited recently where two cows had died suddenly during the night from some unsuspected cause. Post-mortem examination showed intense inflammation of the fourth stomach and portion of the intestine. It was suspected that they had been poisoned, and an investigation revealed a barrel containing a preparation intended for foot-rot treatment to which the cows could easily obtain access. They had apparently done so, as it was easily seen that some of the preparation had been removed within a short time.

Specimens from one of the cows and from the foot-rot preparation were submitted to the laboratory, which reported that both specimens contained a large amount of arsenic.

Yearling Heifers Poisoned by Privet

POISONING by a privet hedge occurred on a farm in the Cheltenham district, Manawatu, recently. The farmer reported having lost five yearling heifers, and several others were palpably sick.

Two of the animals were killed for examination purposes, and the post-mortem revealed intense inflammation of the fourth stomach and portion of the intestines. From this it was assumed that the heifers had been poisoned. The usual inquiries and a thorough search of the paddocks, etc., were made for lead and other materials of a poisonous nature, but nothing could be found.

A privet hedge (*Ligistrum* species) surrounding the house and bordering on to the paddock in which the heifers had been grazing was then inspected, and it was apparent that the stock had been eating it freely. As the hedge was in the berry-bearing stage it was decided to submit a specimen to the Systematic Botanist for examination, and in the reply he stated: "The plant is poisonous, although it is not clear from the literature just which stage is most toxic, the berries being suspected."

Zinc Poisoning In Pigs

SEVERAL reports of zinc poisoning in pigs have been received by inspectors in various parts of New Zealand. A case came under notice recently where a farmer lost six weaner pigs which were being fed mainly on skim milk, and it was found that the zinc poisoning was caused by the milk being pumped through new galvanised iron pipes.

The mortality rate from zinc poisoning may be easily minimised by simple precautions, and farmers are recommended to read an article on this subject in the August, 1939, issue of the "Journal" on page 140.

Stock Ailments

E.G.A. (WAITOA):—

I am experiencing a good deal of foot trouble in my cows this year. I have had a lot of experience with this same trouble, but not just as bad as now. When I first noticed the cows limping I cleaned out the foot, washed it well with warm water and disinfectant, then dried and applied spirits of salts. In some cases this has cured them, but others have got worse. So I bathed them in hot water with Epsom salts, and then poulticed them. They began to discharge and continued to discharge, but got no better. In one case there is a growth. This I cut out, but I do not seem to get the roots.

I have also had mange in my horses, caused by a horse I broke in for my neighbour. I have tried several things from the chemist, but they have done no good. I am now trying turps., oil of tar, and linseed oil.

I also have a cow down with something like milk fever. I have drenched her with calcium drenches and other drenches for milk fever, and inflated

Advisory Service on Veterinary Matters.

Farmers are invited to submit inquiries connected with the health of their stock, and the replies will be published under this heading.

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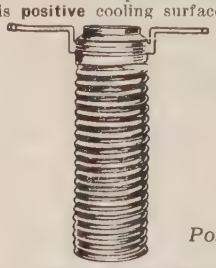

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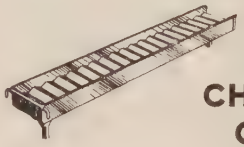

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the udder, but she is still down. She just eats a little hay, but cannot get up. I would be glad to know what you recommend. I am sure it is not staggers. Could you please tell me if Epsom salts are any good for poulticing to draw?

LIVESTOCK DIVISION:—

You are working on the right lines in your treatment of the foot trouble in your cows, except that the use of spirits of salts is rather drastic and may cause injury to sound parts of the foot. The affected foot should be thoroughly washed in the first place, and then poulticed. After poulticing, any discharge that may be present should be cleaned up and any dead tissue carefully removed and the foot washed in some disinfectant.

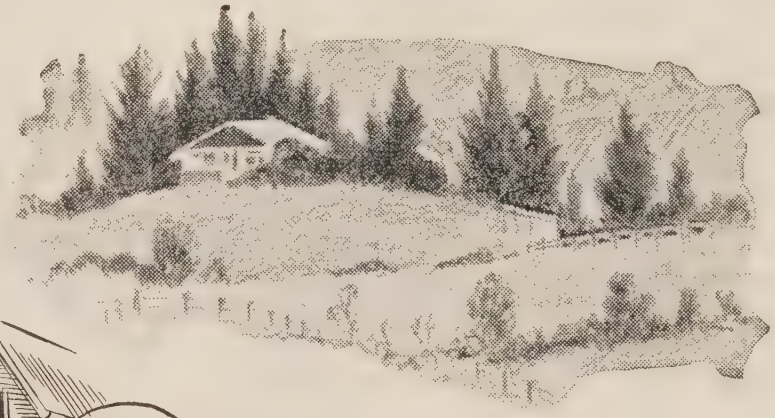
If the whole foot can be held in a bucket of water to which some disinfectant has been added, so much the better, but if this cannot be managed a syringe should be used so that any cracks and crevices can be thoroughly cleaned out. After this, a plug of cotton wool should be placed between the toes or on the injured part and the whole foot bandaged. The bandages should be removed daily for the first few days and the foot washed in some disinfectant, any dead pieces of tissue removed, and the foot rebandaged. As healing progresses, the time between the dressings can be extended

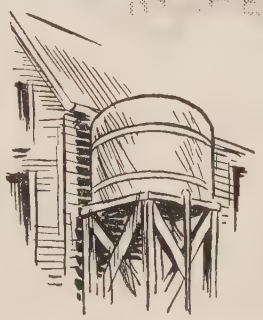
The majority of the foot cases seen on farms are due to germs gaining entry to the tissues of the feet through small cuts, punctures, or abrasions, where they set up centres of inflammation and suppuration, and cause great pain. The most likely places for the germs to be picked up are in yards where cows have been congregated for years, or in muddy gateways that have been in use for a considerable time.

As you appear to have had a good deal of trouble with your cows it is probable that you have some such place where they are getting infected. Therefore, it would be advisable for you to try and avoid driving your cows through any muddy places near your shed, and also to clean up and metal any gateways that are constantly in use. It is only by these methods that foot troubles, which cause so much annoyance and loss, can be avoided.

With reference to mange in your horses, mange is caused by a minute parasite, and has not been seen in New Zealand. Therefore, it is hardly likely your horses are affected with this trouble. Many horses at this time of the year lose their winter coats. Sometimes the coat comes off in patches and certainly gives the animal what might be termed a "mangy" appearance. The only treatment necessary is a little extra feeding and careful grooming, and as the animal improves in condition the trouble disappears.

You do not say whether your cow has calved or not, but as you have treated her for milk fever it is presumed she has. The case appears to be one of paralysis, only the hindquarters being affected. In treating a case of this kind care should be taken not to let the cow lie on one side too long. She should be moved from side to side every two or three hours and kept in a sitting position by means of bags filled with hay being placed behind her shoulders. A stimulating liniment should be rubbed along the spine, especially over the loins, and the animal kept warm. If the legs appear to be cramped they should be rubbed with wisps of hay to restore the circulation. She should be assisted on to her feet even if she can only stand for a short time at first, for the longer she is down the less chance she has of getting up. Your other treatment by giving drenches and feeding on hay appears to be on correct lines.





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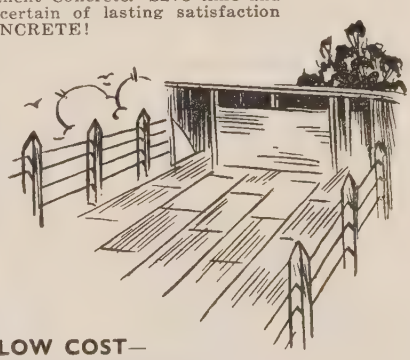

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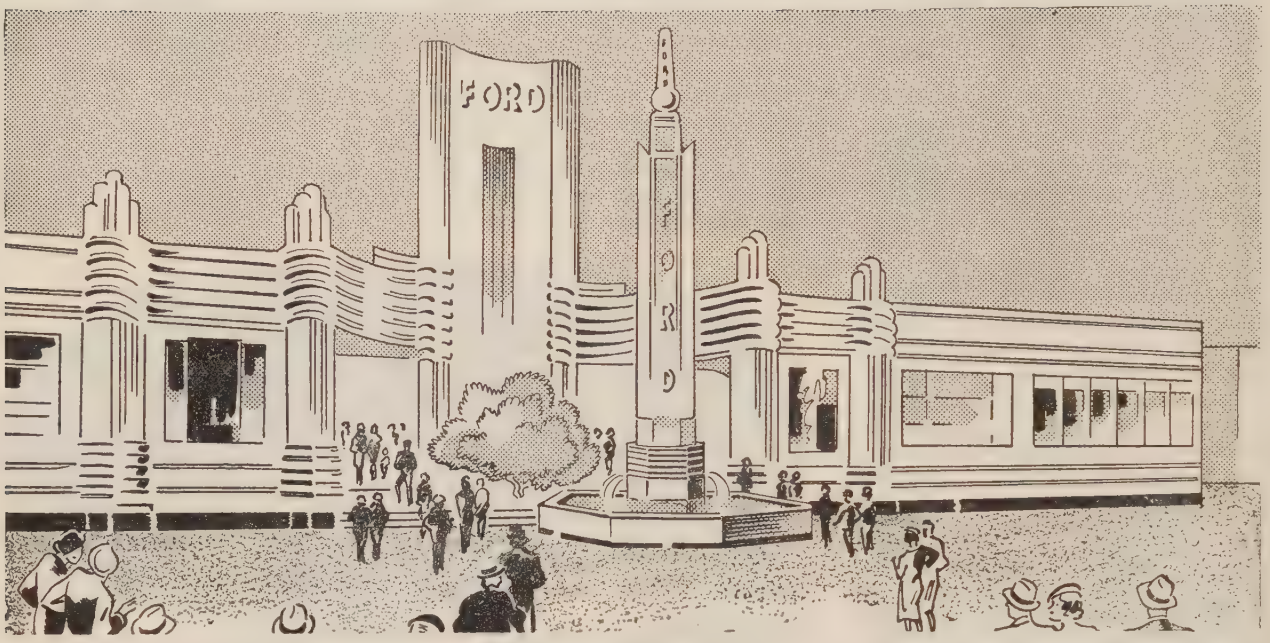

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Farm Practice and Management

Contributed by Officers of the Fields Division

Use Only Certified Grass And Clover Seeds

COMPARISON.—Pedigree white clover on the left, and uncertified white clover on the right.

ALTHOUGH the farming community as a whole is conscious of the value of using certified grass and clover seeds, one still frequently meets farmers who are going to a good deal of expense in breaking in country and preparing a seed bed, only to nullify much of their efforts by sowing seed of an inferior quality.

Much has been written concerning the various strains of certified pasture seeds available, and it is not intended to elaborate on this aspect any further.

The average stockman usually buys the best stock he can afford and insists upon knowing an animal's pedigree and production history before he will purchase it.

Were many farmers to pay as much attention to the quality of their grass and clover seed as they pay to the quality of their stock, there would be a great improvement shown on many of our pastures. One only too often hears of farmers sowing seed that is "just as good as certified," with frequently disappointing results. With certified seed one is buying seed of a known quality, whereas with uncertified seed—no matter how glowing the accounts of its worth may be—one is buying in the dark.

WEED INVASION.—Certified seed on the left, uncertified on the right.

Cost of Seed

An argument frequently advanced by those using uncertified seed is that the cost of certified seed is too great. But if a farmer is willing to pay a good deal more for a pedigree herd sire than he would for an unregistered animal he should also be willing to pay the extra for the certified seed.

It is also said that certified seed will not grow in certain areas. This may be due to faulty preparation of the seed bed. On the light pumice soils of much of the Bay of Plenty, for example, thorough consolidation is essential, and many failures of pastures to establish can be traced to this source. It is far wiser to handle a small area of ground, work it thoroughly, and sow in the best seed available than to try to handle too large an area, with

indifferent working, and sow in poorer quality seed.

The value of sowing certified seed on a well-prepared seed bed has been definitely proved, and one feels that it is far wiser to put down a small area each year with this seed than to attempt to sow down such a large area that only poor seed can be purchased.

A farmer's pastures are his most valuable asset, and he cannot hope to obtain the maximum production from his stock unless his pastures are the best possible.

—A. V. ALLO, Instructor in Agriculture, Tauranga.

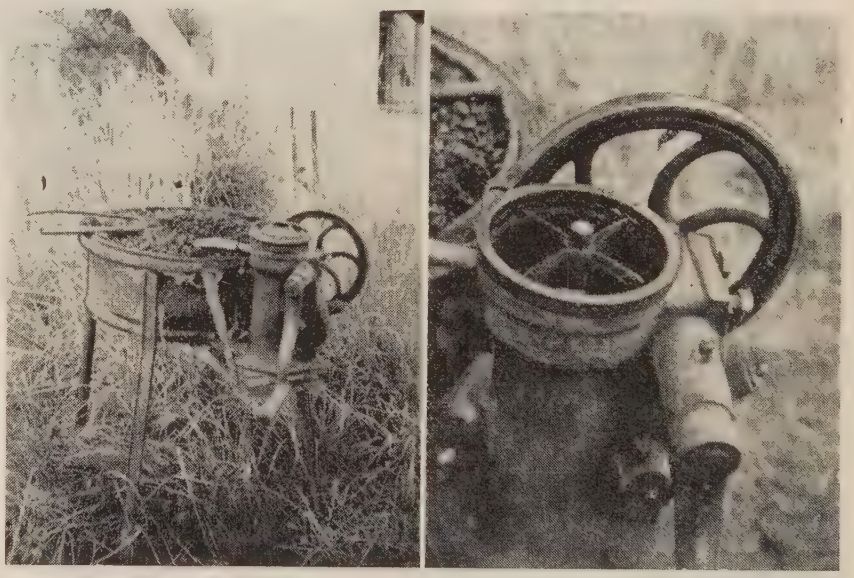
GOOD PASTURE.—A pasture sown down in certified ryegrass and white clover in the Bay of Plenty.

A Simple and Effective Forge

IN this mechanical age a farmer who who is able to carry out his own repairs to plant and implements saves not only time but money. Part of the stock in trade of a well-equipped farm workshop is a forge, and the illustrations show an ingenious method by which a forge can be made at little cost from an out-of-date separator and a 44 gallon drum.

The drum is cut in half and the top edge turned over the band fitting round it, and four legs are bolted on to the bottom band. The separator sits on a platform bolted to the bottom of the drum and supported by metal stays.

The draught for the fire is provided by an impeller attached to the bowl spindle, and is led through a pipe, screwed into the drain hole in the bowl housing, into the centre of the cinders.



Left: The complete forge, showing the drum with the separator attached.

Right: The impeller attached to the bowl spindle.

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The four vanes of the impeller are attached to the bush by making slots with a hacksaw and soldering them in.

The whole outfit is simple and yet effective, and a handy person should have no difficulty in copying it.

—A. S. NASH, Instructor in Agriculture, Rangiora.

Stamping Out Gorse With Cattle

Cattle feeding on hay on the gorse area.

IN the "Journal of Agriculture" for February this year I wrote an article on "Destruction of Gorse and Blackberry." In it I mentioned the value of hay-feeding on gorse areas and the damage cattle do in trampling as they live on the hay.

In July I visited a farm where this was being put into practice, and the illustrations show clearly the good work being done. The farm is a gorse farm—one of the kind where difficulty is experienced in deciding where to start the work of eradication.

The farm was taken over by Mr. J. B. Armstrong, Papatoetoe, who has made considerable progress against the gorse. The soil is a heavy clay of poor fertility, lacking in lime and phosphate to a great extent, but capable of growing high-class pastures if these deficiencies are supplied. The country is rolling, but because of the heavy subsoil, moisture is retained to a considerable extent in the winter, and heavy concentrations of stock quickly churn the soil to mud.

Start Made

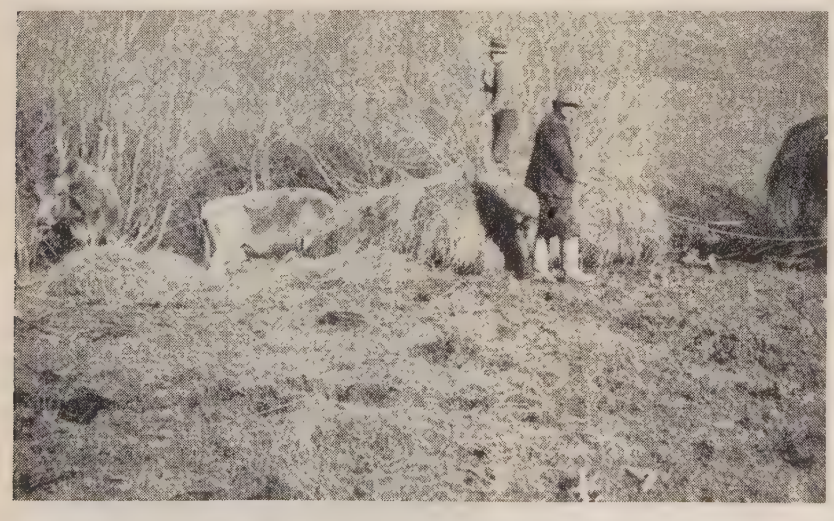
A start was made this year on an area of tall gorse. First, a section of the standing gorse was fired in the summer. The standing sticks were cut close to the ground with slashers, and were heaped and burnt. By the autumn a good strike of gorse, brought about by the burn, was established all over the ground surface.

Better strikes of the gorse would probably have been attained by cutting and then burning. The other method may be easier, but if the gorse is not cut soon after burning it becomes very tough and the work difficult. The object of burning the gorse was to germinate as much as possible of the seed near the ground surface.

In the background the uncut and burnt gorse. In the foreground, where the sticks have been cut and burnt, the feeding out has churned the soil to mud.

During the winter large amounts of hay were fed to dairy cows on this area. About four acres were treated in this way. The cows feeding on the hay churned the soil to mud, and the wetter the conditions the better work they did. The seedlings did not survive long after this treatment.

The concentration of the 30 to 40 dairy cows on this area not only destroyed the seedlings, but also destroyed any regrowth from the stumps, and it also saved the poaching of the good pastures. Hay was brought from



Spreading the hay from a sledge. The hay was sledged from the far side of the farm, nearly one mile away.

every quarter of the farm to feed on the area.

Treatment of Area

After the winter is over an area such as this could be tackled in different ways. It could be topdressed to encourage growth from grass and clover seed established from the hay. The area could be surface-worked and sown with a suitable permanent grass mixture in the spring. It could be surface-worked in the spring before the ground became too dry, and worked over in the summer for sowing down the following autumn.

As grass strikes are better in this country in autumn sowings, and as working over the summer will destroy any gorse seedlings which will germinate later, the last plan appears the safest to adopt. Success depends largely on the effect of the burn on the germination of the seedlings. The more of these that are germinated the better, because they are easily killed by the concentration of stock fed on hay in the winter.

After seeing the work done by dairy cows on Mr. Armstrong's farm I came to the conclusion that cattle used intelligently are not so useless after all as controllers of gorse, and that the vaunted superiority of sheep over cattle in this direction is not so well established.

—J. E. BELL, Instructor in Agriculture, Auckland.

A close-up of the effect of the tramping.

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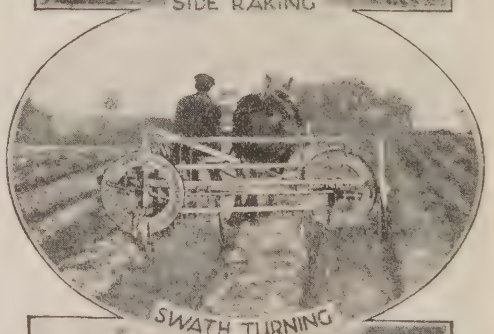

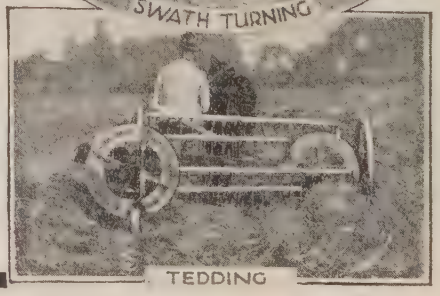

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The Orchard and Vineyard

Contributed by the Horticulture Division

Orchard Notes

Disease Control and Harvesting

DURING the remainder of the growing season the main activities connected with the actual production of the fruit crop are spraying for control of disease, and cultivation of the soil. These operations should continue throughout the summer months or until the approach of the harvesting season. Upon both these orchard practices depend the health and vigour of fruit trees, and they naturally influence the bulk of fruit ultimately produced.

Quality and uniformity in size are influenced by fruit thinning. This orchard practice requires special attention, and may be continued with advantage with apples and pears right to the end of December and to a later period where a second thinning is undertaken to eliminate defective fruits.

Preparation for the approaching fruit harvest will also require some attention, and it is especially important that a reasonable quantity of case material should be on hand and a good proportion of cases made up before the season begins.

Disease Control

Spraying for the control of diseases which attack the fruit of apple and pear trees should be carried out at regular intervals so that adequate coverage is always maintained. Under normal conditions fruit trees will be fairly heavily foliaged by now, and will have reached their maximum density in most varieties and will remain dense until the trees begin to open through the weight of the developing crop.

Complete coverage—so essential for disease control—is more difficult to secure at a period when it is most required, especially in control of codling moth. Warmer days and higher night temperatures favour moth activity, and peak emergence may be expected any time from the end of November and during December, and possibly earlier in northern districts.

All this points to the need for equipment capable of giving good coverage, and then care in operating, giving sufficient time to the work to ensure that every part of the tree is thoroughly wetted. Pressure and disk apertures of spray nozzles should be such that they will give good penetration during the mid-summer period. Increased penetration follows an increase in pressure, an increase in diameter of disk aperture, an increase in the number of whorl-plate openings, and an increase in the diameter of whorl-plate openings.

Disk apertures should be not less than 5-64 in. for summer use. Whorl-plates recommended are of the following specifications:—1-8 in. thick and 1 3-16th in. diameter, with six openings of 1-8 in. diameter centred on a circle 5-8 in. diameter and drilled at an angle of 45 degrees.

Spraying for Apples and Pears

The spraying of apples may require some modification as the season progresses, especially in reducing the strength of lime-sulphur, if used. Unless growth is fairly vigorous there is a danger of causing foliage injury when lime-sulphur is used at a greater strength than 1-180 in the latter part of the season. This damage is not always manifested by a definite burn, but may take the form of a weakening in tone of foliage and a reduction in leaf size, and only becomes apparent when compared with trees sprayed with the weaker dilution of lime-sulphur plus colloidal-sulphur or colloidal-sulphur as the only fungicide.

For the remainder of the season Cox's Orange, Dunns, Jonathan, and heavily cropping older Sturmer are best sprayed with colloidal-sulphur 2 lb. to 100 gallons plus the usual 1½ lb. of arsenate of lead.

Observations should be made at frequent intervals for signs of apple leaf hopper, and, where discovered, nicotine sulphate 1-800 should be incorporated in the next spray.

Red mite may appear any time from December to the end of the season with the first period of hot, dry weather. Summer oil 1-100 should be used to destroy the mite, and the application should be made before any appreciable injury occurs. The typical bronzing of foliage indicates that red mite is present in great numbers and is already causing serious injury. An interval of at least 10 days should elapse after a sulphur spray before summer oil is applied.

The spraying of pears for the remainder of the season should follow the same procedure as for apples. There should be no necessity for continuing with Bordeaux mixture, which

causes a roughening of the fruit if persisted in.

Spraying Stone Fruit

Peach and nectarine trees will require further sulphur sprays until the fruit approaches maturity in order to reduce the amount of brown rot infection if conditions are at all humid. Lime-sulphur 1-200 plus colloidal-sulphur 2 lb. to 100 gallons will give the most satisfactory results.

It is unwise to use any sulphur spray on peaches if rain is threatening and there is likelihood of a shower preventing the quick drying of the spray. Some defoliation has been known to occur under these conditions.

Should brown rot occur, it is very important that diseased fruit should not be handled at the same time as clean fruit, as contact with diseased fruit will certainly cause further losses.

Fruit Thinning

The operation of fruit thinning is an important orchard practice in improving the general quality of the crop. The more obvious benefit from fruit thinning is the general increase in the size of the remaining fruits and a greater degree of uniformity in size, both important factors in reducing handling costs. It provides an opportunity for eliminating diseased or damaged fruit from the crop before the harvesting begins, and saves the handling of such fruits in the packing shed.

With a heavy setting of fruit it is difficult to thin too heavily. A heavy crop often requires thinning to single fruits to a spur, and even beyond that point. Short-stemmed apple varieties always require thinning to single fruits to prevent them being forced from the spurs as the fruits swell and press against each other. This is particularly important with Gravenstein, and even with Dunns and Cox's Orange if the crop is normal.

The first operation in thinning should be to break up clusters by removing the centre fruit in a cluster, partly as a disease control measure, and then to reduce to either single fruits or pairs according to the crop. Spacing should then be regulated according to the diameter of the shoot upon which the fruit is borne. Heavier wood is capable of maturing more fruit for its length than weaker wood.

Peaches and nectarines should be so spaced as to avoid, if possible, two fully-grown fruits touching. Thinning should be done in such a way as to leave the stem attached to the spur, thus avoiding any weakening of the fruit retained.

—N. J. ADAMSON, District Supervisor, Nelson.

Citrus Notes

General Work and Citrus Pests

WITH the approach of summer, every effort should be made to put citrus groves in good tilth and to reduce weed growth to a minimum. Weeds not only compete with the citrus trees for the available plant foods, but also transpire considerable quantities of water during the hot weather, thus tending to reduce the water supply available to the trees.

If the orchard is in permanent cover crop, this should be kept cut short. It is not necessary to place the cut material around the trees, as the tree roots soon extend over the whole area of an orchard, but it is often desirable in order to reduce the weed growth near the trees. This mulch therefore serves a double purpose.

The severe winter experienced this last year caused many trees to be affected by frost damage, resulting in die-back or hail damage and causing a large percentage of the crop to be affected. In some instances many fruits were left on the trees, as picking was unwarranted.

Now is the time to overhaul these trees. Reshape the trees and remove crossing branches. Prune off entirely branches too near the ground, or shorten back to a lateral if the branch is still of value but has overgrown its strength. Remove all dead wood, and also cut out some of the very upright growths towards the centre of the tree which bear only a few fruits of poor grade and are difficult to pick.

Citrus Pests

Dicky rice weevil (*Maleuterpes spinipes*) is now probably active, the eggs being reported as laid in the August-October period and hatching 28 days later. Where tree banding has been done, it is necessary to rub over the banding material with a stick in order to freshen it and also to control weed growth so as to prevent the weevils from thus obtaining access to the tree above the banding material.

The citrus borer (*Aemona hirta*) will now probably be on the wing. The adult is a long-horned beetle, which flies by night and lays its eggs on any dead or dying citrus twig. As this pest causes considerable damage, it is necessary to prune off and burn affected twigs whenever observed. If the larva has bored into older wood, which it is desired to retain, inject some petrol and plug with grafting wax or petrolatum.

The black aphis (*Aphis Traversi*) will probably be seen now on the young foliage of citrus trees. It is a sucking insect, deriving its nourishment from the sap of the tree. Generally, it appears to affect only odd trees, but, if severe, control by the application of nicotine sulphate 1 part in 800 parts of water plus soft soap 3 lb. per 100 gallons if nicotine alone is used. Unless extremely severe, spray only the trees observed to be infected by this pest.

Scale Insects

Of the scale insects of citrus trees the citrus red scale is the most destructive, and this will be discussed in later seasonal notes. The commoner ones seen now will be the circular black (*Chrysomphalus Rossi*), the olive scale (*Saissetia Oleae*), and the hemispherical (*Saissetia Coffeae*). The circular black scale is almost circular, and

has the appearance of concentric rings on the surface, the central area being a lighter brownish-grey. The olive scale is characterised by a raised H-shaped marking, and the hemispherical scale is a brownish colour, shining and highly convex.

The circular black scale is more often seen on the Poorman Orange, infesting fruits and both sides of the leaves. Another host for this pest is *Elaeagnus Japonicus*. Black sooty mould is not often associated with the circular black scale.

Young forms of the olive scale are now abundant. It infests more the wood of the tree. Honey dew is secreted, and thus sooty mould is associated with this scale, which has a wide host range.

The hemispherical scale is not characterised by sooty mould, but it may be associated with this scale.

All of these scale insects will be controlled by the 3 per cent. certified summer oil, applied later for citrus red scale, but if it is desired to keep trees clean from sooty mould a spray of summer oil 1 part in 60 parts of water is recommended.

Leaf Roller Caterpillar

Leaf roller caterpillar (*Tortrix* moth species) causes some damage to lemon fruits, but is generally more harmful to orange fruits, especially just after the fruit has set until it is the size of a marble. To control, spray with lead arsenate 1½ lb. plus 3 lb. hydrated lime to 100 gallons of water whenever necessary. Use this spray as sparingly as possible.

—A. M. W. GREIG, Citriculturist, Auckland.

Viticulture

Affinity of Stocks and Scions

IN preceding articles on "Phylloxera-Resistant Stocks" the affinity between vine stocks and scions was mentioned. I have been asked: "What is this affinity?" I think a few opinions from some of the world authorities on viticultural matters will not be out of place by way of an answer.

"Affinity depends on the capacity of absorption of the stock and capacity of consumption of the scion, and on certain subtle properties of the two vines that have to live together in the grafted state; properties which cannot yet be detected beforehand, but which nevertheless certainly exist. . . ." "By a bad affinity or lack of affinity of variety for another stock variety, I mean that the one does not, in the long run, grow well or at all on the other.—*A. J. Perrold, B.A., Ph.D., Professor of Viticulture and Oenology at the University of Stellenbosch, South Africa.*

"Where the stock and scion are of the same variety, the grafted vine behaves just as though it had never been grafted." — *"Porte-greffes" (that is, stocks), by L. Ravaz, Professor at the National School of Viticulture, Montpellier, France."*

"Good affinity is shown by an initial moderate fertility which increases up to a certain age limit. Then the size of the crop should remain constant, and only the quality of the wine should improve with increasing age."—*Andor Teleki, Viticulturist, Buda-Pesth, in "Der Weinbau."*

"Something more is necessary than botanical kinship. Just what is necessary no one knows beyond; that there must be conformity in habit between stock and scion; that the two must start in growth at approximately the same time; and that the tissues must be sufficiently alike that there be proper contact in the union. Yet these facts do not sufficiently explain all of the affinities and antipathies which species and varieties of grapes show to each other."—*N. P. Hedrick, Horticulturist of the New York Experimental Station.*

"The character of the union depends on many conditions. The most fundamental is what is known as affinity between the stock and the scion, that is, the durability of the union and the ease with which their respective tissues unite and with which the food streams pass from one to the other. This affinity need not be perfect. Indeed, the increased bearing, higher quality of the fruit, earlier ripening, and other advantages of many grafted vines are probably due to a moderate imperfection of affinity. Without inquiring into the exact nature and causes of affinity, we may define it as the power which stock and scion have of joining together and nourishing each other by exchange of food material." —*F. F. Bioletti, University of California, Berkeley, Cal.*

"Affinity.—Under this name M. Couderc (the well-known French viticultural authority, hybridiser, and producer of some of the best vine stocks in use to-day) places the harmony in the intimate connections which exist between the stock and the scion. The union should be an association for reciprocal benefit between two beings which retain at the same time their individuality; if each one accomplishes his share of the contract, harmony reigns in the association, it prospers, and the affinity is good; if the contrary takes place, affinity is lacking, and the association suffers and may fail altogether."—*E. Durand, Professor of Viticulture, Ecole d'Ecully, Rhone.*

"The laws of affinities of species are almost unknown. The observations hitherto made have been undertaken in a practical rather than a purely scientific spirit. The results obtained up to the present can only be regarded as a matter of fact. No theory has yet been deduced from them except that the kinds to be united by grafting must be of the same botanical family."—*Charles Baltet, in "Grafting and Budding," translated from the French.*

Mr. Baltet is generally accepted as the greatest authority on grafting and budding of plants of many species.

The reference to "Monsignor" Paschoud in last month's notes should have read Monsieur Albert Paschoud.

—J. C. WOODFIN, Vine and Wine Instructor, Te Kauwhata.

Cool Storage Notes

Keeping Qualities of Fruit

THE results obtained with much of the fruit held in cool storage this season have been satisfactory. Nevertheless, the keeping qualities of some varieties of apples and pears have not been quite as good as might have been expected, judging by the appearance and quality of the fruit before it was placed in cool storage. Although the dry seasonal conditions affected the sizing of the fruit, the keeping qualities should have been better than they were in view of the dry, warm seasonal conditions during the months the fruit was maturing.

There were, however, other factors which had the effect of reducing the cool storage life of many of the varieties of apples and pears this season, such as soft scald on Jonathan apples and internal browning in Sturmers.

The first signs of soft scald were found in Jonathan apples as early as May 15. Fruit picked and placed in cool storage on March 21, and also that picked and placed in cool storage on March 31 and held at 35 deg. to 36 deg. F. was badly affected with soft scald. Fruit picked from the same trees on March 10 and placed in the cool store and held at the same temperatures did not develop soft scald.

It is generally recognised that the tendency of this variety to scald is due largely to cool storage temperatures under 38 deg. F. and to the state of the maturity of the fruit at the time of harvesting.

Sturmers

In June of this year signs of internal browning were first discovered in a consignment of Sturmers which had been in cool storage for only three weeks. This fruit was in a very matured condition when placed in storage. Later in the season, however, fairly heavy losses were experienced from this type of breakdown in Sturmers from some localities. In a few lines internal browning was also associated with flesh collapse.

The cause of this deterioration seems to be a combination of climatic and soil conditions, which have caused the fruit to advance rapidly in maturity, and has then rendered the fruit susceptible to this form of breakdown in cool storage.

Delicious

During September a few lines of Delicious apples began to develop fungal rotting in cool storage. In the lines inspected it was found that the time of picking or a delay in placing the fruit in cool storage had been responsible for this form of breakdown. It was interesting to note that fruit from the same trees that had been picked and placed in cool storage 14 days earlier was still in perfect condition in October.

In many orchards where irrigation facilities were not available and the apples were left on the trees too long the fruit was in a more forward condition than was realised when it was picked. This forward condition, in my opinion, and also the presence of fungal rots, has been responsible for much deterioration and loss and a consequent shortening of the life of much of the fruit held in cool storage.

Granny Smith

The condition of Granny Smith variety has shown an improvement this season where the fruit was harvested about April 15 and delayed for from 10 to 20 days before it was placed in cool storage, as very little discolouration has developed on fruit that received this treatment and was held under good cool storage conditions at temperatures from 32 deg. to 35 deg.

Pears

Most varieties of pears have held in good condition this season, although in some lines slight wilt and shrivel were noticeable after a period in cool storage. This condition was noticeable in fruit which was picked before it was matured. In a few lines the condition was brought about by a combined effect of the prolonged dry spell during the period when the fruit was maturing, and what appeared to me to be a slight burning of the surface of the fruit by the spraying mixtures applied.

Correct Time of Picking

Now that higher ranges of temperatures are found to be beneficial for the holding of many varieties of apples in cool storage, it is all the more necessary to pick the fruit at the correct stage of maturity to avoid loss from penicillium soft rot and other fungus diseases. The lower temperatures of 30 deg. to 32 deg. F. were once maintained to check the development of these rots.

Therefore, with the knowledge that the higher temperatures are now being maintained in fruit cool storage chambers, the state of the maturity of the fruit when it is picked and placed in the cool chamber, and strict attention to the spraying and harvesting methods are most important in order to obtain the best results with cool-stored fruit. Cleanliness in the packing shed, sizing machines, and cool storage chambers must be strictly observed in order to avoid losses from fungus diseases, which develop more readily in the higher storage temperatures.

Cleanse All Plant

Immediately after the completion of each harvesting season the owner should cleanse all plant and material used in the preparation of fruit for sale from all debris, which should be burnt or otherwise disposed of.

No rejected fruit from any orchard or packing shed should be stored in or in the immediate vicinity of any cool chamber or packing shed. This rejected fruit should be placed in steel drums (for preference). These drums should be emptied regularly each week.

Be particularly careful to keep the sizing machine clean and free from dust and dirt, which so readily collects on rollers, etc. Serious surface marking to the fruit results from such neglect. These marks take some time to become noticeable, but eventually they discolour and are the cause of complaints from overseas buyers and also from buyers on our local markets.

All packing sheds should be so constructed to admit sufficient light and ventilation for the purpose of efficient inspection of fruit during the process of sizing and packing.

—A. POWELL, Cool Storage Officer, Wellington.

The Home Garden

Small Fruits and Flowers

Herbaceous Flowering Plants

Wm. C. HYDE, Horticulturist, Wellington.

HALF-HARDY flowering annuals are still available for planting out, and are useful for brightening up any desired position in the garden and affording variety and a new interest. In wind-swept, bone-dry, or shaded situations there are plants of this class which will thrive and bloom abundantly in any position if carefully selected.

Planting is best done when a period of dull or showery weather may be expected, and if this operation is preceded by working into the soil a little bonedust and superphosphate, and followed up (if a dry period should be experienced) by occasional irrigation until the plants are established, little further attention will be required.

Thinning, stopping, staking, and tying young growth and buds of plants in the herbaceous border will now occupy considerable time if a good display is to be obtained. On that account it is wise to keep this area well within the limits of the labour available.

Lifting Daffodils

WHERE narcissus and other spring-flowering bulbs are to be lifted, it is usually best to do so now as soon as the foliage really begins to die off. The bulbs should not be unnecessarily exposed to the sun, but should be spread thinly in a well-ventilated shed or other position free from draughts and strong light. When dry they are cleaned, graded for size, and stored in a dry, cool shed until wanted for planting.

Some kinds, chiefly from Africa and the Levant, are rather exceptions to this rule in that they can hardly be sun-roasted too much, as in their native state they are accustomed to hot, dry summers. *Iris tingitana*, a native of Tangiers, is a handsome, winter-flowering, bulbous iris which in some places refuses to bloom without a summer treatment of this kind. Where it is not desired to lift bulbs of this class, the necessary conditions for flowering them satisfactorily may sometimes be provided by covering the plants with a glass frame as soon as they die down, and so providing the dry, hot conditions required during the resting period.

When the bedding plants in the frames are cleared, consideration may be given to sowing seeds of perennial herbaceous plants (such as anemone, pansy, viola, primrose, polyanthus, etc.), biennials (such as stocks and wallflowers), and, during February and March, hardy annuals, including sweet peas, for flowering during winter and spring.

Berry Fruit Crops

Losses of small fruit through the ravages of birds would be greatly reduced if the fruit were gathered as soon as it begins to colour. If it is gathered then, when it is cool and the surface dry, it will in a few days develop good natural colour and full flavour.

This specially applies to cooking fruit. Gooseberries at that stage make an excellent conserve, whereas, if they are picked later, the skins cook tough.

Summer Watering

DURING dry periods in summer, late-planted shrubs and shrubs similar to rhododendrons, which like moisture, should be watered well and given a light mulch of half-decayed stable manure or lawn clippings, etc. Young climbing plants set at the base of a warm wall will be specially grateful for such attentions.

As garden operations have to be planned for at least 12 months ahead, special consideration should be given now to the requirements of the planting season, whether it be for timber or shelter, fruit or flowers. The kind, variety, and number of each required should be decided, and the position they are to occupy. Also, any removals of young trees or shrubs into a different position in the garden that may be required should now be decided on.

Notes of this kind made during the summer, and the local nurseries searched for suitable stock, will enable the preparation of the land to be undertaken in due season and planting done to best advantage.

The Cultivation of Vegetables

Contributed by the Horticulture Division

Sowing the Seeds

F. SYDENHAM. Assistant Horticulturist, Wellington.

MAKE sowings of seeds as recommended in the summary in ground that has been prepared for the purpose by digging or forking. If the soil is sandy consolidation is necessary, and this can take place if the soil is left for a few weeks to settle. It may be hastened by rolling or treading the ground before producing the final tilth and marking the furrows for the seed. This treading must not be too severe, and the ground must not be made to resemble a path. Treading need only be done in strips the width of two boots where the rows are to be.

The furrow for small seeds is best made by using the back of the rake with the garden line in front of the teeth of the rake. Seed is then sown **thinly,** and is sufficiently covered by holding the rake vertically and, with brisk movements, lifting and lowering the rake so that the head displaces soil from the sides of the furrow and covers the seed. At the same time the ground is firmed so that moisture can rise to the surface.

Larger seeds, such as peas and beans, which are planted two to three inches deep, are planted in a furrow made with a draw hoe. The seeds are planted and the soil raked level over them. The seeds of these two crops are planted singly three to four inches apart. Rather than plant peas in one straight row, place them in a double row 4 ins. wide, and space the seeds over this area three to four inches apart.

Planting Seedlings

IF possible, plant out seedlings after a shower of rain. On light soils which do not pug they may actually be planted in the rain. All that is necessary for each seedling is to make a small hole with the trowel. Place the roots, carrying as much soil as possible, in the hole, replace the soil, and press it firmly round the roots.

As a general rule, plant all seedlings at approximately the same depth as that at which they grew previously. Leeks and celery, however, are exceptions, and are usually planted in trenches about 6 in. deep so that they can be well earthed up later. Leeks may be dropped into holes made by pushing a sharpened piece of timber, such as a broken spade handle, into the ground. The hole is made of such

What To Do in the Vegetable Garden This Month

Summary of operations for the month (until the middle of December).

SEEDS TO SOW.

Continue fortnightly sowings of lettuce, radish, peas and dwarf beans.
Make sowings of short-horn carrots, globe beet and swedes for winter use.

SEEDLINGS TO TRANSPLANT.

Plant out seedlings of the September-October sowing of leeks, savoy cabbage, cauliflower, Brussel sprouts, celery and celeriac.
Plant late crops of tomatoes about the middle of December.

PERENNIAL CROPS.

Discontinue cutting asparagus about the end of November, and manure the beds.
Manure rhubarb beds, and cut out seed stems as they appear.

GENERAL WORK.

Tie up and remove side shoots from early-planted tomatoes.
Keep the ground hoed to destroy weeds and to conserve moisture. Especially should this be done after a shower of rain.
Apply liquid manure to salad crops.
Thin out all seedling crops.
In dry weather, water as required.

SPECIAL NOTES FOR WARMER DISTRICTS.

Transplanting of melons and cucumbers should be completed by the end of November.
Make successional sowings of sweet corn.

In most localities this period offers the last opportunity, until the autumn rains come, of planting vegetables. From Christmas onwards dry conditions are expected, and by then the roots of plants must be well established in the ground so that they can obtain moisture from the lower levels.

depth that when the roots of the plant are at the bottom of it the leaves are showing above the surface. A little soil pushed into the hole or a little water poured into it after the plant is dropped in is all that is required to bring about establishment.

Celeriac, or turnip-rooted celery, is not planted in trenches, but on the flat. Both these forms of celery require moist conditions.

Control of White Butterfly

The white butterfly at this season will be starting its attacks on cabbage and cauliflower crops. The caterpillars are effectively kept in check by dusting the plants, and especially the growing parts, with one of the derris dusts.

This dust is quite harmless to the plant, and to be of any use against the caterpillars (the butterfly itself does not harm the plants) it must be applied every seven to ten days. Other remedies are suggested, but none is as effective as a derris dust.

Perennial Crops

ASPARAGUS should not be cut later than the end of November, and cut until then only if the plants continue to send up strong, plump shoots. When cutting ceases, give a dressing of bonedust, basic slag, or superphosphate and potash (muriate, sulphate or salts) in equal proportions at the rate of 2 oz. of the mixture per square yard of the bed. Also, mulch the beds with partially-decayed farm manure or compost. This might appear to be an excessive amount of manuring, but when it is remembered that the crop produces only from the reserves it stores up during the summer (for it has no green leaves when the shoots are being cut) the wisdom of renewing those resources is apparent.

Similar remarks apply to the rhubarb. The leaves which are produced in the spring to nourish the plant are pulled with the stalks, and the plant must build up a reserve so that it can produce heavily the following winter and spring. Still, little harm comes from removing a few stems from the plants during the summer and autumn.

Seed Planting Recommendations.

Crop.	Distance between rows (inches)	Thin out to (inches)	Manures Recommended (quantities per square yard)
Dwarf beans ..	24	Nil	Rotted farm manure. Super 2 oz.
Peas (dwarf) ..	18-24	Nil	Rotted farm manure. Super 2 oz.
Lettuce	15-18	8-12	Rotted farm manure. Blood and bone or super 4 oz. (liquid manure or nitrate of soda 1 oz. to 4 gals. water during growing season).
Carrots	12-15	3-6	Blood and bone or super 2 oz.
Beet	12-15	4-6	Blood and bone or super 2 oz.
Swedes	15-18	6-8	Blood and bone or super 2 oz.

Transplanting Recommendations.

Crop.	Distance between rows (inches)	Distance between plants (inches)	Manures Recommended (quantities per square yard)
Leeks	18	8	Rotted farm manure. Blood and bone or super 2 oz. Sulphate of ammonia 1 oz
Savoy cabbage ..	30	30	Rotted farm manure. Lime (ground) 4 oz. Blood and bone or super 2 oz.
Cauliflower ..	30	30	Rotted farm manure. Lime (ground) 4 oz. Blood and bone or super 2 oz.
Brussel sprouts	36	36	Rotted farm manure. Lime (ground) 4 oz Blood and bone or super 2 oz.
Celery	18	12	Rotted farm manure. Blood and bone and super 2 oz. Sulphate of potash ½ oz Liquid manure during growth.
Tomatoes ..	36	30	Blood and bone or super 2 oz. Sulphate of potash 1 oz.

Seasonal Don'ts

Don't

let weeds grow large. While growing they are competing with the plants for nutrients, moisture, and space. Water at this time of the year and later is usually in short supply, and the plants require all they can get. Nutrients are seldom over-plentiful and should not be wasted in producing unnecessary growth.

Light and air are essential in producing vigorous, healthy plants, and if weeds overcrowd plants the latter will never make maximum growth. It is easy to get rid of weeds before they have passed the seedling stage, when they have only very small and undeveloped rooting system.

Don't

water the ground every time the surface is dry. The surface of the soil should be constantly worked and always dry. When dry, weed seeds will not germinate readily, and the surface acts as a layer between the drying elements, the sun and wind, and the moisture that is held in the lower layers of the soil, preventing undue evaporation of the water.

If the soil has been well prepared before sowing or planting—a heavy soil loosened up, and a light soil loosened and allowed to consolidate before being used—this moisture should have no difficulty in moving from the moister parts (usually the lower layers) to the surface. It cannot travel through the loosened surface, and hence remains about the plant roots, where it is required.

After each shower of rain the surface layer should be loosened to produce this mulch. If the ground is dry, water it thoroughly and next day loosen the surface. In this way watering, even in very hot, dry weather, need be done only once a week, except in the case of very small seedings, the roots of which are very near the surface and in soils that are very open and over-drained. A surface mulch of decayed farm manure, compost, or even fresh lawn clippings will assist considerably in keeping the surface of the soil cool and moist, at the same time providing valuable humus.

When watering, do it thoroughly. Small amounts moisten only the surface layers and stimulate shallow root activity, with disastrous results in very dry weather. Once the leaves of the plant have grown and cover the spaces between the rows they themselves act as a protection against excessive evaporation of moisture from the soil, and the maintaining of a surface mulch is not so necessary, nor is it so easily done.

APIARY NOTES

Contributed by Officers of the Horticulture Division

How To Go About Queen-raising

WHILE bee-keeping as a whole is an interesting occupation or hobby, there is perhaps no part that is so fascinating as the queen-rearing part of the work. All amateurs should, where possible, try their hand at rearing queens for their own use. The commercial bee-keeper, whose aim is to produce as much honey as possible, generally finds it more profitable to purchase queens from a reliable breeder, as he has not the time to devote to this phase of bee-keeping.

November and December are perhaps the best months to make the attempt. The first step is to procure a purely-mated Italian queen bee, for, although it is possible to raise queens from black or hybrid bees, it would seem a waste of time to do so. It is always advisable to breed from the best stock, and the Italian bees have long been recognised as far superior to other races of bees in this country.

If you have no suitable pure queen in the apiary, send to some reliable breeder of queen bees and order a tested Italian queen. This will cost about 12/-. She will usually be sent by post in a special queen cage, and with her will be a number of attendant bees to keep her warm and comfortable.

Examine the Bees

When she arrives examine the bees through the wire cloth to see that the queen is alive, but do not open the cage. Should she arrive dead (which rarely occurs) post the cage back to the supplier, who will usually supply another one if the loss is no fault of yours. If everything appears to be in order, put the cage aside in the meantime in a cool place, and on no account place it where the hot sun can shine on it, or the queen may perish from the heat.

Now go to the hive to which you intend giving her and look through until you find its queen, and then destroy her immediately. Look through each of the breed frames carefully, and destroy any queen cells that may have been started. This is important, as the bees will rarely accept a new queen if they have queen cells of their own started. Do not attempt to give them a new queen until the old one has been removed.

Do not infer that the hive is queenless because you cannot find her or because there are no eggs or brood in the hive; it may be that there is a virgin queen in the hive which has not yet started to lay. It would be quite hopeless to expect the bees in the hive to accept the queen under such conditions. Black queens are often very hard to locate, as they are very timid and will run about and hide. For this reason it may be easier to make the attempt with a weak colony, where it would be easier to find the queen than would be the case in a thickly-populated colony.

How To Find The Queen

If all attempts at finding the queen fail the best method will be to procure a "queen-excluder" and sift the bees through it. To do this, nail the excluder to the bottom of the half super, and then nail on the excluder a piece of board about four inches wide and one inch thick and the length of the super, so that the edge of the batten is flush with the side of the super. Remove the hive containing the queen from its bottom board, placing it aside for the time being. Put an empty hive in its place on the stand, with the sieve over it. This should be placed so that the board on the bottom overlaps the empty hive below by the width of the board. This will leave a corresponding gap at the opposite side in which to put the frames when shaken.

Place over the sieve box the super containing the frames and bees. Lift out each frame one by one, shaking off the bees into the hive and sieve. Start with the frame nearest you, giving it a sharp shake to dislodge the bees, and then place it in the bottom box through the gap, pushing it under the sieve. As the other frames are added they can be pushed along into position in the hive below. When all are shaken the remaining bees may be dumped into the sieve and a sack placed over it and left until most of the bees have found their way to the brood frames below. A little smoke puffed under the sack will hasten the descent.

When most of the bees are below, the drones and queen, being too large to get through the excluder, will be readily found in the sieve trying to get through. When the old queen is disposed of the new queen in the cage may be introduced.

Introducing the New Queen

Do not interfere with the cage containing the new queen. One end of the cage will contain soft candy, which blocks up a small hole or tunnel

through the end. Over this hole will be tacked a piece of cardboard. Do not remove this, as its purpose is to delay the release of the queen for a few hours, but a few pinholes may be pricked through it to assist the bees to gnaw through.

The cage may now be placed face-down over the frames under the mat. The bees will soon begin to eat through the cardboard, and will tunnel the candy until the queen can work her way out. This will perhaps take two days, and by this time the bees will have become friendly and will readily accept her.

After the cage has been given, do not disturb the hive for at least a week, otherwise the bees may attack and kill the queen, as she is there only on sufferance for some days. A quiet peep may be taken on the third day just to see that the bees have started to remove the cardboard at the end of the cage, but it must be done quietly and without disturbing the bees. If they have not started the card can be removed and the hive left for a few days before again opening it.

Preparation

After the pure Italian queen has been safely introduced and has begun to lay a hive may be prepared for queen-rearing. There are different methods of queen-raising. Some bee-keepers prefer to transfer the young larvae into artificial queen cells, while others prefer the natural method of allowing the bees to raise their own cells around the larvae. The first method is advised only for experienced bee-keepers who require large numbers of cells. For the beginner the natural method is recommended at least for a start.

Take a fairly strong colony; one that has already attempted to raise queen cells is to be preferred. Make it queenless, and destroy all queen cells which have been started. Place an empty comb in the centre of the brood frames in the pure colony, and five days later there should be young larvae just hatched, as well as eggs. Once again go through the frames of the hive to do the queen-rearing, and again destroy all queen cells. Remove one frame, and place the frame containing the pure larvae in the centre of the brood nest, marking the date on the top bar.

Being queenless, the bees should now start to raise queen cells on this frame, but, as they may also start cells from their own brood, it will be necessary to examine them again eight days after the queen has been removed. All cells other than those on the select frame must be destroyed. If the hive is strong any number of cells up to ten or more may be started, but unless a number are required it is best to save only such as are wanted, allowing an extra one or two in case of accident.

After Hatching

It takes 15½ days from the laying of the egg to the hatching out of the queen. Therefore, as the larvae when placed in the hive would be about one day old or four days from the egg, it would mean that the queens should emerge in about 11 days. As the first queen to emerge will immediately begin to destroy the others, it will be necessary to remove the cells on the tenth day. On that day such hives as are to be re-queened should be made queenless and a queen cell given to each.

The queen cell should be cut out from the comb, taking care to leave sufficient base to it, and placed in a cell protector, which is inserted into the comb of the hive requiring re-queening. Leave one cell in the hive that has raised the queens. In one or two days these cells should have hatched out, and a pure virgin queen should be present. In ten days to a fortnight she should be mated and should begin to lay. Twenty-one days after she begins to lay her young bees should hatch out, and the hive should soon show signs of becoming Italianised.

Stores

ALTHOUGH spring is now well advanced, there is still a danger of the bees in certain colonies dying from lack of stores. If, however, the weather continues good the danger is not great. It is in cases where there is a scarcity of early nectar-producing flora and in continuous unsettled weather that the colonies are likely to use up the last of their stores in raising young bees.

By this time the bees should be occupying from six to eight frames, which means that a large force of young bees is constantly hatching out. By the end of this month, however, there should be plenty of field bees capable of gathering the increasing quantities of nectar now becoming available.

Supering

NOW is the time to put on extra supers. When the bees in the brood chambers are covering from five to six frames an extra super of drawn combs should be added. In districts which produce a quantity of thick, dark honey such as is gathered from the tea-tree or similar shrubs, the experienced bee-keeper usually prefers to give the colonies a super filled with frames of foundation wax. By this means he not only increases his supply of combs, but also forces the bees to utilise this class of honey in building wax, and to conserve their effort to get more of the white clover honey which comes in a month or so later.

Queen-Excluders

MANY beginners make the mistake of putting on a queen excluder on the first, or brood chamber, too soon. At this time of the year the queen, if she is any good, should require at least 15 frames of combs for her brood-rearing, and to confine her to the bottom box is to cramp her and cause the hive to swarm. At this period she should have the run of two boxes for her egg-laying.

The queen excluder can be put over these when they are well occupied, and all above be used to store surplus honey. A good bee-keeper would not be satisfied unless he had on at least three supers for surplus stores.

—G. V. WESTBROOKE, Apiary Instructor, Hastings.

Examinations For Chick-sexing

CHICK - SEXING examinations were held during August at Wallaceville and Christchurch. The following candidates qualified for second-class certificates:—

Mrs. F. D. Carter, Springston, Canterbury, who sexed 100 White Leghorn chicks in 13 minutes 10 seconds, with an accuracy of 93 per cent.

Mr. Allan Fletcher, Longburn, who sexed 100 White Leghorn chicks in 20 minutes, with an accuracy of 91 per cent.

Notes for the Poultry Farmer

Contributed by Officers of the Livestock Division

Essentials for Turkey-raising

ACCORDING to the census taken in March, 1936, the turkey population of New Zealand had increased by 7.85 per cent., as compared with the 1924 census. Returns from provincial districts showed:—

Auckland	45,388 birds
Hawke's Bay	5,039 birds
Taranaki	5,676 birds
Wellington	12,657 birds
Marlborough	1,020 birds
Nelson	2,580 birds
Westland	287 birds
Canterbury	6,871 birds
Otago	5,116 birds
Southland	1,488 birds
Total	86,102 birds

From these figures it will be seen that more than 50 per cent. of the turkeys are to be found in the Auckland provincial district.

Three Essentials

Three essentials for the successful rearing of turkeys are:—

(1) Good, healthy, well-matured breeding stock.

(2) Suitable environment as regards soil and climate.

(3) Proper care in cleanliness and feeding, especially until the poults are more or less able to look after themselves.

Selecting Stock

Many who have tried to breed turkeys have found them difficult to rear, and quite a few birds seen in the local markets are not of the quality that they might be. In many cases these defects would be corrected if special care had been taken in the selection of the breeding stock.

The breeding birds should be selected for vigour, constitution, and vitality, and should be well matured. Seldom does a person who breeds from immature or inbred stock make a success of turkey-rearing. For this reason it is not advisable to breed from first-year birds, especially hens. The breeders should be selected from the best of the two-year and older birds.

A pair of bronze wing turkeys.

Indications

The chief signs of constitution and vitality are physical activity, alertness, rich-coloured plumage, width across back, and size of shank. The body should be deep and broad, with good width of back throughout its length, and the thighs short and well meated.

Birds which show good type or body formation should be selected. Small narrow birds, and those showing lack of bright plumage and very fine in shank, should be avoided.

Introducing Fresh Blood

In addition to the careful selection of the breeding stock it is essential, if the vitality of the flock is to be maintained and increased, to ensure that new blood is regularly introduced. In fact, the importance of new blood cannot be overstressed, provided, of course, that it is of the correct quality.

New blood may be introduced by the purchase of eggs for hatching or by fresh males. If eggs are purchased care should be taken to mark the young birds so that they may be identified when they grow up, and then only those showing indications of good health, vitality, and which are of good type should be retained. The poorer specimens should be culled when other birds are being sold.

When new blood is to be introduced by means of male birds, it is a good plan to purchase sufficient birds to mate the whole flock of breeders, and in order to avoid the danger of in-breeding it is advisable to dispose of any males which have already been used for breeding purposes well before the breeding season. It is also well to remember that turkey hens will often wander a great distance in answer to the call of a male. Therefore, when it has been decided to introduce new blood, it is advisable to obtain eggs or males from another district in order to be certain of getting fresh blood.

Mating

Much depends upon the vigour of the selected birds in regard to how many hens may be mated to each male. Sometimes success has been obtained when as many as twelve hens have been mated with each tom, but, generally speaking, seven or eight hens with each tom is sufficient. Turkey eggs take from 27 to 29 days to hatch. The very fresh eggs usually hatch a day or two before those a week or so older. They may be successfully hatched in incubators and the poults reared in brooders, but in this country nearly all turkeys are hatched and reared in the natural way.

It may be mentioned that in some countries quite a few breeders now hatch and rear turkeys by artificial means, and confine the young birds in small wire-floored sun parlours attached to the front of the brooder. Half-inch wire-netting is used for the floors, which are raised off the ground. This is done to guard against blackhead, a disease of the liver which is common among turkeys, especially those raised on stale ground. This trouble usually attacks the poults at about six to eight weeks old, when they are shooting the red and when their vitality seems to be lowered.

Turkey hens make quite good mothers, but it is advisable to confine them with the young ones for the first ten days or so according to the weather. A good roomy coop, with run attached, should be provided, in which the turkey can stand erect and move about. If such conditions are not provided some of the poults are likely to get trampled to death. Where such a coop has been used previously, it should be thoroughly cleaned and washed out with a good strong disinfectant, care being taken that the disinfectant reaches all cracks and corners in order to destroy mites and disease germs.

The coop and run can be placed on the ground, but it should be in a dry situation and, above all, be on clean ground where poultry have not been running. The coop should be moved regularly, especially while the birds are confined.

Guard Against Insects

As insects are liable to infest young turkeys at any time, one must be ever on the watch, and fight against them. A good plan is to dust the hen before she starts to sit, and again during the period of incubation. A suitable dusting mixture can be made of equal parts of fine dry road dust, coal ashes, and sulphur. This should be dusted well into the feathers, especially under the wings and round the vent.

To be effective, the mixture must be very fine, so that it is drawn into the breathing tubes of the insects, thus suffocating them. Another method of ridding the birds of insects is to rub a little nicotine sulphate under the wings and along the breast-bone. If a little sweet oil is rubbed into the heads and under the wings of the young poults it will assist in keeping them from becoming infested.

As young poults are susceptible to sunstroke, they should be given protection from the direct rays of the sun. If they appear to be listless, slow moving, and inclined to stagger, it would indicate sunstroke, but if they have plenty of protection from the hot sun and do not seem to thrive and constantly "peep peep," one may suspect insects and treat them accordingly.

Feeding Turkey Chicks

There are many different methods of feeding turkey chicks, and if a particular method has proved successful it is not very desirable to make a change. The following method is suggested to those who may not have had success.

About 24 hours after hatching sprinkle a little fine sand and oyster-shell chicken grit on paper or boards on the floor of the coop, and about an hour afterwards give a light feed of a mixture consisting of breadcrumbs and rolled oats mixed crumbly with beaten-up raw eggs. Four feeds of this mixture may be given on the first feeding day, and as much given as the chicks will clean up. The mash should not be left to get stale.

On the second day the same mixture should be given, with the addition of a little finely-cut (about the size of wheat grains) succulent greenstuff, such as dandelion leaves, onion tops, tender lucerne, or lettuce.

On the third day some dry curds, from which the whey has been squeezed, and a litle pollard can be added. This mixture may be fed for seven or eight days, and then an alternative feed of a good chick grain mixture should be given.

However, the curds and green food should be increased, and a little dry curds may be left for the poults to pick at. Gradually the mash is changed, until it is made up of two measures of pollard and one measure each of dry curds, bran, and greenstuff. When the birds are about five weeks old three feeds per day will be sufficient, one of grain and two of mash, the grain mixture consisting of three parts of cracked wheat and one of cracked maize. After the first week a dish or hopper of dry mash may be left in the coop for the birds to pick at as they wish. Boiled potatoes or other vegetables can be mixed in the mash, but green foods and curds are very important items of the turkey chicks' menu.

Clean water should be within reach at all times. Whole milk may also be given, but great care should be taken that the drinking vessels do not become sour. The young ones should always be fed in dishes or small troughs, and not on the ground. The reason for this is to guard against contamination.

Although the poults should be protected from bad weather, they should not be pampered, and should be encouraged to roam after about ten days, provided the grass is dry. In order to assist the beginner it is advisable to emphasise the point that turkeys and fowls should not be reared together. Young turkeys must be reared on fresh, clean ground. Before marketing always select the best for breeding purposes.

Where Turkey-raising Is Popular

According to the census, turkey-raising seems most popular in the following counties:—

North Island.

Rangitikei	3,374 birds
Piako	3,064 birds
Waikato	3,047 birds

South Island.

Ashburton	1,490 birds
Maniototo	1,158 birds
Vincent	1,346 birds

—C. J. C. Cussen, Chief Poultry Instructor, Wellington.

N.Z. Federation of Young Farmers' Clubs

Edited by S. Freeman, Dominion Organizing Secretary

Y.F.C. National Centennial Memorial Tree Planting Scheme

AFTER reviewing reports from the various councils, the special committee appointed by the Dominion Executive to consider the proposed Y.F.C. National Centennial Memorial Tree Planting Scheme decided at a recent meeting that it would be practicable to proceed with the undertaking. A circular briefly outlining the proposals was forwarded to all units of the organisation.

The scheme embraces the planting by clubs and club members of trees as a National Centennial Memorial, the trees to be supplied, through the Federation, by the Department of Internal Affairs, and made available for the 1940 planting season. It will be a contribution by the Young Farmers' Clubs towards a memorial to the early settlers who have done so much for the Dominion; the project envisages the planting of public grounds, etc., with trees.

The report prepared for the committee by Mr. A. C. Cameron, Chairman of the Otago-Southland Council, is so comprehensive that it has been adapted to serve as a detailed explanation and a guide for clubs which intend to undertake the scheme in their respective districts.

Objective

The objective is to be the permanent improvement of one or more areas of public ground by tree planting as a Young Farmers' Club District Centennial Memorial. The trees should be planted in a spot where they will be seen and admired by residents in the district.

Due regard should be given to the size of the trees when grown, the needs of road safety, and such things as possible overhead wires and other factors which might lead to the damaging or removal of the trees at some future date.

Position

Club members should scout round without delay and decide upon a suitable position for the memorial. In deciding upon a position the following suggestions may be helpful:—

(a) As a rule, each district has a natural centre, and there may be suitable places in or adjacent to such a centre where planting could be carried out. The planting may take the form of specimen trees or groups of trees.

(b) The planting may be done in the local domain or A. and P. Society's grounds, and may take the form of specimen trees bordering the ground, a group of trees in a corner, or an avenue leading in.

(c) The planting may be done round a local dairy factory, school, hospital, or any other public institution.

(d) Where the highway has been straightened, planting could be done where the road used to be, provided the old surface is broken.

(e) The Lands and Survey Department has agreed to advise clubs, upon application, of any Crown lands handy to district centres, areas reserved for domains, special reserves, etc., where planting could be done, and it is suggested that clubs explore the possibilities in this direction before deciding where planting will take place. Application may be made direct to the local Field Inspector, Lands and Survey Department, or through the Dominion Y.F.C. Organising Secretary in Wellington.

(f) Roadside planting may be done in certain highways, specimen trees being recommended for this, the trees to be planted approximately a chain apart.

(g) Where the most suitable spot would appear to be private land adjacent to a centre or highway, for example, a corner where crossroads meet, the owner might be persuaded to make a gift of such land to the district, the district authorities attending to the necessary survey and transfer, and paying the cost. There are, doubtless, difficulties in this connection, but they are not insurmountable. (Mr. Cameron states that he has had many experiences of such gifts of land in connection with the Dunedin Amenities Society.)

(h) It has been suggested that the top of a hill in a district might be planted. This has possibilities, but it is considered that such a proposition would mean planting with conifers or cypresses, as other trees do not thrive too readily in too exposed positions.

Permission

In every case, before proceeding with the work permission must be obtained in writing from the competent authority, that is, the Public Works Department or county council in the case of roadside planting, and directors of dairy factory, education board, and school committee, A. and P. Society, domain board, as the case may be.

Protection

It is useless planting trees unless consideration is given to the following factors:—

(a) There must be sufficient soil to give the trees an adequate start.

(b) If the position is windswept it may be necessary to plant a temporary break of *pinus insignis* on the weather side or to erect a manuka fence.

(c) The trees must be fenced off from stock, and in certain localities rabbit netting will be essential.

The fencing will, in many cases, prove the deciding factor in selecting a position, as obviously there is a limit to what individual clubs can afford. Specimen trees may be protected by, say, a ten- or twelve-foot square consisting of four stout posts with barbed wire (and rabbit netting where necessary), care being taken to prevent cattle from stretching over the wire. If no fenced area is available and trees have to be planted on the roadside in this manner, then a club may have to

limit itself to comparatively few trees because of expense.

Fencing must definitely be left to the initiative of individual clubs, and if farmers or others can be persuaded to assist in this respect, well and good.

Trees

It is not suggested that clubs be asked to stand the expense of trees. The Department of Internal Affairs will make available trees from various sources, and the following is a list of those so far procurable from the Christchurch Botanical Gardens:—

Acer Buergeriana. — Medium-sized ornamental tree, suitable for park and street planting. Present height, 4ft.

Acer Colchicum Rubrum. — Large-sized ornamental tree, suitable for park and street planting. Present height, 3ft 6in.

Acer Saccharinum (Sugar Maple).—Medium-sized tree suitable for park and street planting. Present height, 3ft.

Aesculus Hippocastanum (Horse Chestnut).—Large spreading tree suitable for all purposes. Present size, 2ft.

Carpinum Betulus. — Medium-sized ornamental tree suitable for park and street planting.

Castanea Sativa (Spanish Chestnut).—Large spreading tree suitable for all purposes. Present height, 3ft and 6ft.

Fagus Sylvaticus (English Beech).—Large spreading tree suitable for all purposes (excluding street planting). Present height, 5ft.

Quercus Aegilops ("Valonia Oak").—Splendid spreading tree suitable for park and general planting (excluding streets). Present height, 4ft.

Quercus Sessiliflora (Durmask Oak).—Large spreading tree suitable for general planting (excluding streets), especially on dry areas. Present height, 6ft.

Nothofagus Fusca (New Zealand Red Beech).—Present height, 2ft.

Nothofagus Cliffortioides (New Zealand Mountain Beech).—Present height, 2ft.

Supplies of English beech, oaks, and horse chestnuts of a present height of 1ft or more are also available, but because of their smallness they are not suitable for street or park planting. They could, however, be utilised for group planting where suitable.

Mr. Cameron has suggested, more particularly for districts in Otago and Southland, where the rainfall is good and frosts not too severe, the following as specimen trees, being hardy and suitable for street planting:—Limes, English beech, horse chestnut, Spanish chestnut, silver birch, golden poplars, rowans, plane trees, and the various species of *acer*.

For grouping, he suggests *prunus pissardi* or *prunus nigra*, oaks, New Zealand mountain beech, New Zealand red beech, ornamental crab apples, kowhai, ribbonwood, flowering apples, cotoneaster, junipers, etc. Where positions are suitable he recommends the planting of New Zealand natives, but states that, generally speaking, they are unsuitable for planting on roadsides as specimen trees.

Natives should be protected, if possible, by flax, veronicas, ngaio, olearia, etc., until the larger-growing trees, such as totara, become established. Kowhai, ribbonwood, and New Zealand beech are hardy, and will stand up to isolated positions. Local authorities recommend deciduous trees for street planting, and practically all natives are evergreen. While the foregoing is not by any means a complete list of trees available, Mr. Cameron gives it as an indication of the varieties which may be planted.

Time for Planting

Planting should be done in either late autumn or spring, according to locality. It is suggested that when the position is decided upon a "working bee" should get everything ready beforehand in order to leave very little to do when the actual planting takes place. A feature could be made of the planting by inviting other bodies and organisations to make a picnic function of it.

Notices

It is suggested that with a view to securing the interest of the district and preventing vandalism a notice be placed on the spot indicating that the planting is a Centennial Memorial carried out by the local Young Farmers' Club and giving the date, etc.

Future Upkeep

This should be considered, as obviously steps will need to be taken to see that neither stock nor rabbits destroy the trees, and that they are not choked by weeds. Once the trees grow to a certain height they will look after themselves.

General

The scheme was first mooted before the outbreak of war, and there is at present a tendency on the part of some clubs to refrain from undertaking any special activities. The Centennial Tree Planting Scheme, however, is one which can well be carried out by clubs in many districts. It should be remembered that it will be a memorial to the pioneers who have done so much towards bringing this country to its present productive state; it will help mark a milestone in the progress of the Dominion, and it should serve to show that young farmers are not unmindful of what they owe to posterity. The fact that the planting is to be done at a time of national crisis should serve to add interest to the ceremony.

It is suggested that clubs which are interested in the scheme should select sites for planting as soon as possible, and communicate with their district committee in order that the Federation may arrange for the necessary supplies of trees to be made available through the council.

Western Bay of Plenty Football

A SUCCESSFUL seven-a-side Rugby tournament was held at Omokoroa on June 28. In spite of wet weather, more than 150 club members and supporters attended. The football was of a high standard considering the heavy ground and greasy ball, and some close matches resulted.

Results were as follows:—

First Round.—Paengaroa A 3, Omokoroa B 0; Paengaroa B 6, Tauranga 3; Omokoroa A 19, Waihi 0; Te Puke 9, Combined Team 0.

Second Round.—Paengaroa A 9, Paengaroa B 0; Omokoroa A 19, Te Puke 0.

Final.—Paengaroa A 6, Omokoroa A 3.

The final match between Paengaroa and Omokoroa was played at a fast pace, and both sides handled well. Superior back play swung the balance in favour of the Paengaroa team, for which tries were scored by P. Volz and G. Mortensen. For the losers, L. Nicholas kicked a penalty.

The winning team was as follows:—G. Mortensen (captain), E. Gordon, B. Gordon, A. Riddell, P. Volz, A. Walter, and G. Ranapai.

The day concluded with a full match between a combined Omokoroa-Waihi team and the remainder of the district, the latter team winning by 11 points to nil.

Cups were presented by interested Omokoroa farmers to the members of the winning team, and the afternoon concluded with afternoon tea supplied by the Omokoroa Y.F.C.

—A. V. ALLO, District Secretary, Western Bay of Plenty.

How One Club Minimises Transport Difficulties

G. M. BARR, Hon. Secretary, Kaukapakapa Y.F.C.

THE restrictions on petrol have added to the difficulties which some clubs have experienced in the transport of members to and from meetings. The system which our club has put into operation is a simple measure to reduce these difficulties, at the same time introducing other desirable features, and it may be of interest to others.

A suitable number of members are chosen, one for each locality of the club's territory, and these undertake the duty of organising transport for the members from their respective districts. This merely involves finding out which members wish to attend the meeting and what cars are available for their use. Arrangements are then made so that the minimum of cars are taken and that all concerned are "given a lift."

It is necessary, of course, that every club member be communicated with either by those responsible or others delegated by them. This is normally done by telephone, and, apart from the question of transport, this direct and personal communication provides an effective means of reminding members of meetings and encouraging their attendance.

As the work involved is shared by a number of members it does not bear heavily on anyone. Indeed, by providing special duties for a greater proportion of the club's members the system encourages the greater interest in club affairs which, as a rule, comes from active participation in its organisation.

Above all, it is proving effective in practice.

North Auckland Y.F.C. Tour

G. T. STUDHOLME. Hon. Secretary, Arapohue, Y.F.C.

DURING the first week-end in July some 38 members of the Young Farmers' Clubs from the Dargaville and Whangarei districts travelled to Auckland on the first stage of a tour. At Onehunga they inspected the Onehunga Woollen Mills. Here, all processes through which the wool underwent from the bale to the finished cloth or blanket were closely examined. Travelling through the Mangere district, where numerous small farms and market gardens were to be seen, they reached Otahuhu and inspected the garages and workshops of the Passenger Transport Company. After lunch the Challenge Phosphate works were visited. Although the manufacture of superphosphate was not in full swing, members gained a good idea of the processes.

The North Auckland Y.F.C. touring party at Rainbow Springs, Rotorua.
[J. Batchelor, photo.

Leaving Auckland by train that evening the party proceeded to Frankton, and left again next morning by bus. Passing through the Morrinsville, Te Aroha, and Paeroa districts, it was noticeable that feed was very short, and the members from the Northern Wairoa district considered themselves far better off in this respect. A stop was made at Waikino, where a visit was paid to the treatment works of the Waihi Goldmining Company.

Passing through the rapidly-developing Waihi Plains, the party reached Kati Kati, where they were entertained to lunch by members of the Kati Kati Club. Later the party visited Messrs. Francis Bros.' farm at Omokoroa. The pastures, hay sheds, and the application of machines to grassland farming were particularly interesting. After being entertained to afternoon tea by Messrs. Francis Bros. and the Omokoroa Y.F.C., the party travelled to Tauranga and inspected the Gate Pa battle site. The party was entertained at a dance that evening by the Tauranga Club.

A launch trip arranged by the Tauranga Club was made next morning to the Mount. On the return to Tauranga the citrus factory was visited. Reaching Paengaroa, the party was entertained by the Paengaroa and Te Puke Clubs to an enjoyable lunch. In the afternoon a visit was made to Messrs. Ross Bros.' piggeries, where the management and feeding of the pigs was carefully explained. After being entertained to afternoon tea, the party proceeded to Whakatane, and stayed there for the night.

Next morning the hill behind the town was climbed, and a wonderful view of the Rangitaiki Plains was obtained. A visit was later paid to the paper mills, where the processes involved in turning the pine timber into cardboard were described. The party then travelled to Edgecombe, via Thorton, and to the Rangitaiki Dairy Company's piggeries. After lunch as guests of the Edgecombe Club the factory was inspected, and then the farm of Mr. McCracken. On the journey to Rotorua the party was able to view

the lakes before darkness set in. At Rotorua the local clubs entertained the party to a social evening, at which the shield for the best Y.F.C. exhibit at the Waikato Winter Show was presented to the winners, the Rotorua district clubs.

Saturday and Sunday were spent in sightseeing, the places of interest being Orakei-Korako, Blue and Green Lakes, the buried village at Te Wairoa, Tarawera Lake, Whaka, and the Blue Baths. Many members also viewed the thermal regions from the air. The pumice land development areas were inspected on the Saturday, but members were not favourably impressed with the country, which at the time of the year was certainly not looking its best.

After leaving Rotorua on Monday, a halt was made at the Rainbow Springs, where the trout confined to these remarkably clear pools provided a sight that few of the party had seen before. The party continued through the Putaruru district to the Arapuni hydro-electric works, where an interesting hour was spent. The Ruakura Animal Research Station was reached at mid-afternoon, and here the actual part of the tour ceased. Several members, together with Mr. E. H. Arnold, Instructor in Agriculture, Dargaville, who had accompanied the party on the tour, then left the party. The remainder joined the rally of the Young Farmers' Club members of the Auckland Province.

In conclusion I would like to thank all those persons who helped to make the tour such a success and for the splendid hospitality they extended.

Bay of Plenty Young Farmers Tour North Auckland

A. V. ALLO, District Secretary, Tauranga.

THE THIRD annual tour of the Bay of Plenty Young Farmers' Clubs began on 5th July, the party leaving the Bay on its way north. Thirty-three club members made the trip, accompanied by Mr. J. B. Cawte, advisory president of the Paengaroa Y.F.C., and Mr. A. V. Allo, District Secretary. Two comfortable buses accommodated the party.

On the first day the party travelled to Auckland via the Hauraki Plains, and on the Wednesday the tour began in earnest. We left Auckland via the harbour ferry, and arrived in Wellsford at midday, when we were met by Mr. P. S. Syme, Department of Agriculture. After lunch we visited the farm and orchard of Mr. P. Beecroft, Te Hana, and were impressed by his modern apple packing and grading plant and his very fine pastures and dairy herd.

The party then left for Whangarei, being met en route by Messrs. Arnold and Glanville, Department of Agriculture, and also by members of the Whangarei clubs. The night was spent at Whangarei. In the evening we attended a dance at Ruatangata held by the local clubs.

The following morning the party visited the Jersey stud of Dr. G. Walker, and Mr. F. Morgan demonstrated the fine cattle bred on the farm. After lunch the party visited the Portland cement works and inspected the manufacturing processes. After tea the Mayor of Whangarei, Mr. W. Jones, welcomed the party, and a debate was later held between the tourists and the Whangarei Junior Chamber of Commerce. The subject was, "That the Country Serves the Community Better Than the Town." The Bay, represented by A. V. Allo (District Secretary), A. F. Walter (Paengaroa), R. Walford (Kati Kati), and H. Chester (Waihi) took the negative, and was defeated by a narrow margin after a good contest.

The Western Bay of Plenty Y.F.C. touring party at Whangarei.

Party Divides

The following morning the party divided into two groups, one going north via the West Coast, in charge of Mr. Arnold, and the other going north via the East Coast, in charge of Mr. Glanville. The two parties saw the same items of interest, but had to travel in this way because of accommodation difficulties.

The party in charge of Mr. Glanville left for Pahia on Friday morning. En route, Mr. N. Taylor, Soil Survey Officer, explained the soil types, and Mr. Glanville described the methods of breaking in the various types of soil.

The party arrived in Pahia in time for lunch, and after lunch embarked on a launch trip around the Bay of Islands harbour, visiting Zane Grey's fishing camp and Russell. The historic church at Russell was of great interest to the party.

Next day we left Pahia for Keri Keri, visiting the old church at Waimate North en route. We were then shown over the Keri Keri citrus factory by Mr. P. Everett, Orchard In-

structor, and were impressed by the modern lay-out.

A visit was then paid to the citrus orchard of Mr. A. Graae, who gave an interesting talk on the citrus industry in the district. After lunch Captain Voelcke, Keri Keri, spoke on big game fishing, illustrating his talk with photographs. We then proceeded to the ironstone country, where Mr. Glanville described its formation and how it could be broken in. Afterwards we proceeded to Kaeo, where members were billetted by the Kaeo and Oruru clubs.

Launch Trip

Sunday was a leisurely day, and a launch trip on the Whangaroa Harbour was much enjoyed, although rain and cold rather spoiled conditions.

On Monday the party left for Kaitaia, where lunch was provided by members of the Kaitaia Club. After lunch the party visited the farm of Mr. A. Thomson, and in the evening the party were guests of the Kaitaia Club at their annual ball.

Next morning the party, accompanied by Mr. Arnold, proceeded to the Ninety Mile Beach at Ahipara. Lunch was provided by members of the Broadwood Club, who also escorted the party over some experimental plots in the district. Oponui was reached at dusk after a long trip via Rangiahua.

The Waipoua kauri forest was visited next day. The beauty of the bush was greatly appreciated, and the highlight was a demonstration of tree-climbing by Mr. Yakas.

Visit to Farm

After a long spell in the forest the party visited the Northern Wairoa Demonstration Farm, and spent an instructive time inspecting the pastures, piggery, and dairy. After tea the party were the guests of the Northern Wairoa Club at a dance at Dargaville.

The next morning was spent in a visit to Mr. L. Ambury's farm at Ruawai, where a pasture strain trial and several pastures were examined. The party were interested in the production of beef on this farm, and admired some of the prime stock. Lunch was provided by the Marohemo Club, and, the two buses having met at Maungatoroto, both parties proceeded to Auckland.

The next morning was occupied in a sight-seeing trip around the waterfront drive and a visit to the museum, and most of the party visited the Zoo in the afternoon. The buses left for Tauranga, next day, thus ending a memorable trip and one which, it is hoped, will help along the movement in the north.

The hospitality shown to the party at all stages did much to make the trip a success, while the co-operation of northern clubs and instructors assured that the utmost benefit was obtained from the visit.

Mid-Canterbury Inter-Club Debate For Rotary Cup

THE ANNUAL debate between the Mid-Canterbury Y.F. Clubs was held in the Hinds Schoolroom before a large audience. In addition to the president and members of the Ashburton Rotary Club, members and supporters of the Y.F.C. from all over the county were present.

The visitors were welcomed by the chairman of the Hinds Club, Mr. E. Rhodes, who stressed the gratitude of the clubs to the Rotary Club for the interest it was taking in the movement. He then placed the meeting in the hands of the advisory president, Mr. L. Chisnall.

The subject was: "That Modern Methods of Farming Compete Successfully with Rising Costs." The speakers were:—Affirmative: R. Penney, L. Bush, R. W. Wightman (Methven), and T. Mulligan, E. Rowell, S. Sewell (Mayfield). Negative: E. Rhodes, B. Simmons, D. Tait (Hinds), B. Clements, J. Burrowes, and A. Bennett (Ashburton).

At the close of the debate the judge, Mr. J. Brown, of the Ashburton Debating Union, awarded first place to Methven. Mr. Brown congratulated the speakers on the high standard of their work, mentioning especially the Ashburton team.

Mr. J. W. Kingan, president of the District Executive, thanked the Rotary Club for its support to the movement,

The Methven Y.F.C. debating team, winners of the Rotary Cup: L. Bush (left), R. Penney (leader, centre), R. W. Wightman (right).

and made a strong appeal to parents and employers to give every support and encouragement.

Dr. J. Russell Wells, on behalf of the Rotary Club, presented the cup to the Methven team, congratulating them on winning the trophy for the second time in succession. He also promised full Rotary support for the movement.

A vote of thanks was passed to the judge by Mr. Inch.

During supper, Mr. T. V. Wilkinson presented the Challenge Shield won by the Hinds Club last year. This shield, donated by the executive of the Mid-Canterbury Farmers' Union, is awarded to the club whose members obtain most points in the Y.F.C. stock judging competition held annually at the Ashburton A. and P. Show. He also congratulated Messrs. Poff and Tait on their success at the stock judging championship held at Lincoln. Mr. B. Simmons accepted the shield on behalf of the club.

The team chosen for the South Island debating championship is: R. Penney (leader), E. Rhodes, L. Bush, R. W. Wightman; emergencies, B. Simmons, E. Rowell, and J. Burrowes.

Taieri Ploughing Match

Compiled by members of the South Taieri Y.F.C.

FOR many years ploughing matches were distinctly out of favour, and it is some 37 years since one has been held on the Taieri. Of recent years, however, they have again become popular, and last spring the South Taieri Young Farmers' Club decided to revive the Taieri ploughing fixture. The paddock was kindly lent by Mr. J. Miller, and was in perfect ploughing order.

Early in the day many spectators were present to see the start of the competitions.

Some of the spectators watching the last furrow being turned in the tractor class. The snow-capped Maungatua Range adds a wintry touch to the scene.

Approximately 1,000 people attended, and visitors came from near and far, North Otago, Otago, and Southland being well represented.

We received 31 entries—15 horse teams and 16 tractors. The ploughing was of a very high standard, and five champions from Southland competed for champion ploughman of the match. Mr. G. Gray, a veteran, carried off the honours, and won the Bremner Memorial Cup. The champion of the tractor classes was Mr. K. D. Townley, a member of the Edendale Young Farmers' Club, who also won the special prize for most points gained by a member of a Young Farmers' Club. Our youngest member (R. Jury, aged 15) was placed first for best-turned-out team open to members of all clubs. He also won the prize for best ins-and-outs in open competition, and the gold medal for competitor under 20 years gaining most points in any class.

There were four main classes, the results of which were as follows:—

CLASS A.

High Cut.—G. Gray (Wallacetown), 1; J. A. Lindsay (Gladfield), 2; J. Hardy (Invercargill), 3.

Best Break.—G. Gray, 1.

Best Finish.—J. Hardy, 1.

Best Ins-and-Outs.—A. McKenzie (Isla Bank), 1.

CLASS B.

Horses, two furrows, coulter cut optional.—A. Cowan (Henley), 1; W. Bissett (Momona), 2; Allison Bros. (Clarksville), 3.

Best Break.—W. Bissett, 1.

Best Finish.—Allison Bros., 1.

Best Ins-and-Outs.—R. Jury (Maungatua), 1.

CLASS C.

Two furrows, tractor plough or converted plough.—K. D. Townley (Edendale), 1; J. Richards (Maungatua), 2; J. Wither (Maungatua), 3.

Best Break.—J. Richards, 1.

Best Finish.—K. D. Townley, 1.

Best Ins-and-Outs.—J. Richards, 1.

CLASS D.

Three or more furrows, tractor plough.—W. Allison (Drummond), 1; Massey-Harris Co., Ltd. (J. A. Miller, driver), 2; J. A. Miller (Maungatua), 3.

Best Break.—W. Allison, 1.

Best Finish.—Massey-Harris Co., Ltd. 1.

Best Ins-and-Outs. — Massey-Harris Co., Ltd., 1.

Best-turned-out three-horse team.—J. Campbell (Momona), 1.

Best-turned-out four-horse team.—Allison Bros., 1.

Youngest Competitor.—R. Jury, 1.

Member Y.F.C., most points.—K. D. Townley, 1.

Competitor under 20, most points.—R. Jury, 1.

The judges of the ploughing were three old Taieri match ploughmen, Messrs. J. Campbell, D. Sinclair, and J. Miller. The judge of the teams was Mr. J. Dow.

It was pleasing to note that club members held their own in open competition, gaining all three places in Class C.

"The last furrow" of an excellent piece of ploughing.

Manawatu District Seven-a-side Tourney Won by Halcombe Team

THE annual Manawatu District Y.F.C. seven-a-side football tournament was held at Palmerston North on August 23. Entries were very good, comprising 26 teams from all parts of the Manawatu, Wairarapa, and Wanganui areas. The day was fine, and the games were played off in good time. During the morning the first three rounds were decided at Rugby Park, where some bright football was seen. Inter-club rivalry is keen in football matters as many of the players are district representatives.

In the afternoon the semi-finals and finals were played at the Showgrounds. After a hard game Oroua Downs beat Waimarino, 5-3, in the semi-finals. Early in the game a try was scored for the winners by Jarvis, a Manawatu B representative, and converted by Dermer. Whale then scored for Waimarino, but the try was not converted.

In the second match Rongotea A met Halcombe B. Rongotea held the advantage for the first few minutes, but Halcombe pressed. Adamson (Rongotea), who plays for United Seniors, broke away, and passed to P. Teazer, who scored. Gloyn converted. Tait (Halcombe) spurted through and scored a fine try. Shortly afterwards he led the movement which resulted in Pye scoring the winning try of the match, making Halcombe the winners, 6-5.

The Halcombe team, winners of the Manawatu Y.F.C. seven-a-side tournament.

In the final Halcombe, who have Tait and Pye, players in the Rangitikei representatives, and the latter also a Wanganui B representative, were too good for Oroua Downs. Oroua Downs were represented by P. Thevenard, an Oroua representative, Devonshire, a Horowhenua representative, Jarvis, a Manawatu B representative, and M. Dermer, a Manawatu representative.

Early in the game J. Hughes (Halcombe) scored from the line-out, but the kick missed. Oroua Downs pressed again, but were driven back by the fast dribbling of the Halcombe forwards. In the second half Halcombe were awarded an obstruction try, J. D. Hughes being tackled in a race for the ball. The kick failed. Immediately afterwards E. Craine scored for Halcombe, making the final score: Halcombe 9, Oroua Downs, 0.

The teams in the final were:—

Halcombe B.—Pye, Prior, J. D. Hughes, W. Tait, E. Blunden, E. Craine.

Oroua Downs.—Devonshire, Doyle, Jarvis, Dermer, Waller, Carmichael, P. Thevenard.

Referees for the games were kindly supplied by the Manawatu Referees' Association.

The dance held in the Empire Hall brought to a conclusion a very successful day. The Cope Cup was presented to the Halcombe B team by the donor, Mr. P. G. Cope. Mr. E. W. Barnett, Dominion president and chairman of the Halcombe Club, also spoke. Mr. A. J. Galpin announced the players selected to play in the trial at Kimbolton to choose players to represent the Manawatu Y.F.C. against Wairoa Y.F.C. Unfortunately this match has had to be cancelled. It is hoped that the tournament will be held next year and that the keenness will be maintained in the Manawatu Y.F.C. sporting activities.

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Hinds Club Dog Trials

The judge, Mr. R. J. Martin, with some of the competitors.

AT a successful field day held recently by the Hinds Club, a dog trial in the form of a drive and yard event was held in the Hinds Domain.

Entries, open to members of the neighbouring Young Farmers' Clubs and Farmers' Unions, totalled 21. Strong halfbred wethers, lent by Mr. W. McConnell, tested the dogs well and provided plenty of thrills for the spectators.

At the end of the day the judge, Mr. R. J. Martin, a well-known Corriedale breeder and exhibitor, gave his decision, and congratulated the competitors on their efforts.

Results were as follows:—W. Keeley's "Jock," 1; Ian Skinner's "Tess," 2; W. McConnell's "Dart," 3.

The winner of Mr. M. D. Cunneen's cup for the member of the Y.F.C. scoring the most points was W. Keeley.

Next year the club hopes to enlarge the competition by adding a long head and huntaway event.

—H. INCH, District Secretary, Ashburton.

Levin Club's Field Day

C. LEWIS, Chairman of the Levin Club.

A very successful and instructive field day was held on July 20 at the farm of the advisory president of the Levin Club, Mr. H. J. Lancaster. Thirty members of the club were present.

The afternoon was spent with two stock judging competitions, which were run on the new Y.F.C. system, and were very successful. These competitions were held with a view to furthering the interests of stock judging in the club and increasing the knowledge of members in this direction.

Two competitions were held, one for Romney ewes and one for dairy cattle, the stock consisting of three stud Romney ewes and three pedigree Jersey cows lent for the occasion by Mr. Lancaster.

The competitions resulted as follows:

Romney Ewes.—R. Speedy, 1; P. Carter, A. Horn, equal, 2.

Jersey Cows.—A. Horn, 1; N. Lewis, R. Horn, equal, 2.

The official judges were Mr. E. P. Neilson, Feilding, who judged the sheep, and Mr. T. Ranford, Whakaronga, who judged the dairy cattle. The judges gave a full account of their reasons for placing the animals.

Group taken at Levin Club's field day. Second from left in the front row: F. J. Rolston (secretary), V C. Lewis (chairman), H. J. Lancaster (advisory president).

At the conclusion of the field day the club chairman thanked the judges, and Mr. Lancaster for the use of his property and stock, and Mrs. Lancaster for afternoon tea.

National Y.F.C. Stock Judging Championships

THE Royal Show, Invercargill, will be the venue of the National Y.F.C. Stock Judging Championships this year. The show will be held on December 12, 13, and 14, and the Stock Judging Championships will take place on the second day, Wednesday, December 13.

District Committees have been invited to arrange teams of from four to six members to compete in the Provincial Championships. Individual competitors may enter for any or all of the classes, and it is hoped that a representative gathering of competitors from all parts of the Dominion will be present.

The following are the classes:—Romney rams, Southdown rams, dairy cows (in milk), beef cattle, Clydesdale horses, bacon pigs.

Trophies for the respective classes have been donated by the N.Z. Southdown Breeders' Association, the N.Z. Jersey Breeders' Association, the N.Z. Hereford Breeders' Association, the N.Z. Clydesdale Horse Society, and the N.Z. Pig Breeders' Association. In addition to this, prize money will be presented by the Otago-Southland Council in each class—first, £2; second, £1; third, 10/-. A Championship Cup will be presented by the Federation to the team gaining the most points in all classes.

A circular containing full details of the competitions has been sent out to all club and district committee secretaries, from whom further information is available. Entry fees are: First entry, 2/6; subsequent entries, 1/- each. Entries, accompanied by fees, should be forwarded to **Mr. S. R. Whyte, Hon. Secretary, Otago-Southland Y.F.C. Council**, by **December 1**, and the full name and postal address of the applicant should be given. Competitors should also state if they wish to take advantage of the special Y.F.C. railway fare concession in order that the necessary vouchers may be prepared and sent to them in time.

—Organising Secretary.

Among the Clubs: Reports on Activities

Western Southland

Lochiel.—Talk by Mr. A. Branks on "First Aid."

Eastern Southland

Moa Flat.—Business meeting. Consideration of football match with Roxburgh Club.

South Otago

Clinton.—Business meeting. Lecture by Mr. G. McDonald, Veterinarian, entitled "Sheep Troubles."

Lawrence.—Arranged broadcast over 4YA, the subject to be "The Care of Farm Implements." Lecture by Mr. G. McDonald, Veterinarian, on "Diseases in Sheep and Care of Ewes at Lambing Time."

Milton.—Business meeting. Lecture by Mr. G. Reid, Stock Inspector, Department of Agriculture, entitled "The Care and Breeding of Horses."

Stirling.—Lecture by Mr. G. McDonald, Veterinarian, entitled "Diseases in Cattle."

Warepa.—Talk by Mr. Angus on "Banking and Farm Finance." Report on the short course at Lincoln College by L. Christie and T. Maitland.

Central Otago

Manuherikia.—A prize for impromptu speeches donated by Messrs. S. Beattie and A. Brown was won by Mr. R. Hore.

Roxburgh.—Address by Mr. S. Frew on "Improved Method of Modern Fruitgrowing."

Dunedin

Middlemarch.—Talk by Mr. W. G. Thompson on his trip to Australia.

Palmerston South.—Mr. A. Twaddle, Palmerston, gave an interesting account of his recent tour of Australia.

North Otago

Enfield.—Debate with Waireka Lodge, the subject being "That Farming Offers Better Opportunity for Young Men Than Other Callings.'

South Canterbury

Cannington-Cave.—Report of meeting of South Canterbury District Committee. Address by Mr. L. Stumbles entitled "Bee-keeping.'

Fairlie.—Illustrated lecture by Mr. C. C. Leitch, Department of Agriculture, on "Pasture Plant Strains."

Geraldine.—Impromptu speeches by club members on subjects of farming interest. At a previous meeting the evening was spent in social activities. Mr. C. S. Davies gave an interesting talk on his recent trip to England via the Suez Canal.

Milford.—Arrangements for debates at next meeting. Address by Mr. J. Edgar on "Shorthorn Cattle.' The speaker traced the history of the breed both in England and New Zealand. Two club debates held "That Military Training Should Be Compulsory in Peacetime' and "That Dairy Farming is Preferable to Sheep Farming."

Pleasant Point.—Talk by Mr. C. Coxhead on "The Growing of Certified Seed for Profit."

Waihaorunga.—Address by Mr. Bevan, Lincoln College, on "Farm Management."

Mid-Canterbury

Ashburton.—Lecture by Mr. Ewer, Department of Agriculture, on "Lambing Troubles And How to Avoid Them.'

Hinds.—Reports on club debate and the Y.F.C. short course at Lincoln College.

Christchurch

Darfield.—Report on annual ball, showing a profit of £11 10s. Talk by Mr. M. Johnston on the upkeep and adjustment of cars and tractors.

Ellesmere.—Mr. E. L. Siddall, Veterinarian, Department of Agriculture, gave a lecture on "Diseases of Dairy Cattle and Their Control." Short talks by club members, "The Ryland Breed of Sheep" (H. Stephens) and "The Live-stock Embargo" (W. B. Morland).

Teddington.—Decided to hold meetings at Motukarara in conjunction with Farmers' Union, the club to provide speakers for alternate meetings.

North Canterbury

Oxford.—Address by Mr. Bevan, Lincoln College, on "Pasture Management." At a previous meeting, Mr. Kippenberger addressed the club on "Business-side of Farming."

Westland

Murchison.—Address by Mr. J. G. Bailey on "Local Farming Problems."

Nelson

Moutere.—Report by Mr. Dragemuller on a recent meeting held in Brightwater, which was attended by Messrs. E. W. Barnett, Dominion President, and S. Freeman, Organising Secretary.

Wairarapa

Alfredton.—Lantern lecture by Mr. N. Lamont, Department of Agriculture, on "Certification."

Ballance.—Talk by Mr. T. Richardson on his recent trip to the British Isles. At a previous meeting Mr. E. Bruce Levy, Director of the Grasslands Division, gave an address on "A Comparison of Pasture Development in New Zealand and Overseas."

Carterton.—Short talks on the recent South Island tour were given by five club members, P. Swinn, M. Knutson, A. Fisher, C. Bliss, and H. McKenzie.

Featherston.—Business meeting.

Mangatainoka.—Lantern lecture by Mr. E. Bruce Levy, Director of the Grasslands Division, on "Comparison of Pastures in New Zealand and Overseas."

Martinborough.—Business meeting. Arrangements for field day.

Masterton.—Final of district debating competition with Tinui Club. Tinui Club won by 312 points to 300.

Manawatu

Apiti.—Talks were given as follows:—"Tractors for Farm Work," by Mr. H. Jenson; and "Bookkeeping for the Farmer," by Mr. J. D. Kilgour. At the previous meeting Mr. M. McKay gave an address on "Care of Skins and Hides," and Mr. E. Osborne spoke on "Handling a Young Dog."

Bunnythorpe.—Lecture by Mr. E. Bruce Levy, Director of the Grasslands Division, on "My Impressions of Grassland Farming Overseas."

Colyton.—Exhibition of sound films by Mr. H. de O. Chamberlain, Department of Agriculture; at a previous meeting a talk on "Parliamentary Procedure," by Mr. J. Link-later.

Halcombe.—Arrangements for dance. Debate with the Junior W.D.F.U., the subject being "That It Is Advantageous to Marry Young." The Young Farmers, who took the negative, were awarded the decision.

Kairanga.—Talk by I. Fraser on his recent South Seas cruise. Address by Mr. J. Link-later on "Parliamentary Procedure."

Kimbolton-Kiwitea.—Mr. H. de O. Chamberlain gave a lecture on "Potato Growing."

Levin.—Addresses by Mr. R. M. Law ("Y.F.C. South Island Tour") and Mr. G. F. Gimblett ("Fencing").

Opiki.—Debate on "That the Tractor Can Economically Supersede the Horse for General Farm Work." The debate was won by the affirmative team, consisting of C. Davey, E. Bond, and F. Much. The team taking the negative was B. Olsen, R. Aitchison, and F. Seymour.

Oroua Downs.—Business meeting. Report on dance received.

Pohangina Valley.—Display of cinematograph films by Mr. L. Earl, Department of Agriculture.

Rangiotu.—Mr. Crossley, Palmerston North, addressed the meeting on "World Affairs."

Rangiwahia.—Mr. Earl, Department of Agriculture, Palmerston North, exhibited several interesting sound films. At a previous meeting arrangements were made for a club dance. Mr. M. Wood spoke on "Rotational Grazing at Lambting-time." This was followed by a general discussion on farming matters.

Rongotea.—Business meeting. Arrangements for broadcast talk.

Shannon.—Mr. Krammes, Palmerston North, gave an interesting address on "Geology in Relation to Oil Survey."

Tokomaru.—Business meeting. Arrangements for dance.

Waituna.—A film display was given by Mr. H de O. Chamberlain, Department of Agriculture, the films exhibited being "Fasciola," "Heredity in Man," and "Pollination."

Whakarongo.—Field day arranged. Address by Mr. R. G. Scott on "Lucerne Growing."

Wanganui

Taihape.—Mr. C. W. Newport, Stock Inspector, Department of Agriculture, addressed the meeting on "Assimilation of Nourishment From Food in the System" and "Some of the More Prevalent Diseases in Stock." At the conclusion of his address the speaker quoted some interesting clauses from the Stock Act.

South Taranaki.

Alton.—Report on annual ball, showing profit of £4. C. Palmer showed his photographs of Australia, and explained items of interest.

Kaponga.—Discussion by members on ensilage-making.

North Taranaki

Cardiff.—The paper on "Piggery Lay-outs" broadcast in June last by the club was read and discussed.

Hillsborough-Tarurutangi.—Arrangements for field day. Discussion on the subject of the forthcoming debate with the Karawaka Club.

Inglewood.—Arrangements for club euchre and dance. Address by Mr. G. A. Blake, Department of Agriculture, on "The Use and Value of Pampas Grass."

Mangamahoe.—Discussion by members on "Farm Shelter."

Mangorei.—Club debate held, the subject being "That Rearing Own Stock is Preferable to Buying Them." The decision was awarded to the team taking the negative.

Midhirst.—Arrangements made to hold two field days. A talk was given by Mr. W. Crosley on "Good Points of a Cow," and Mr. Lepper spoke on "The Good Points of Bacon and Porker Pigs." At a previous meeting, Mr. J. E. Davies, Department of Agriculture, spoke on "The Educational Tour of New South Wales."

Omata.—Arrangements for a club dance. A talk by Mr. Davies on "Horticulture."

Rahotu.—A general discussion embracing several subjects included the following:—"Methods of Control and the Treatment of Mastitis" and "The Advantages to be Gained by Herd-testing."

Tikorangi.—General business. A very interesting address was given by Mr. J. Garner, of Tikorangi, the subject being "Butter-making."

Toko.—An address by Mr. Murray on "Handling of Sheep." At the conclusion of the talk Mr. Murray answered a number of questions on the subject.

Southern Hawke's Bay

Onga Onga.—Business meeting. Discussion on proposals for Centennial Tree-planting Scheme.

Takapau.—Arrangements for club dance. A debate held, the subject being "That the Young Farmers of Today Have More Opportunity Than the Young Farmers of 50 Years Ago." Speakers for the affirmative were W. Waldin and P. Tennent. The negative was taken by F. Fox and G. White. The result was a win for the affirmative team.

Waipukurau.—Business meeting. Discussion by members on lambing.

Northern Hawke's Bay

Matapiro.—Four new members elected. Talk by Mr. R. P. Hill, Department of Agriculture, Hastings, entitled "Grassland Management."

Putorino.—Talks by Mr. McCallum ("The Tallow Department of a Freezing Works") and E. Smyth ("Points on Competing at Dog Trials"). At a previous meeting talks on "Docking Arrangements" (T. Haliburton), "Horse Shoeing' (S. Scott) and "Pack Horses" (A. Headley).

Poverty Bay

Matawai.—Mr. H. J. F. Tombleson gave an address on "How to Conduct a Meeting."

Gisborne.—Address by Mr. K. F. Jones entitled "Soil Erosion."

Te Kuiti

Te Anga Central.—Mr. K. M. Montgomery, Department of Agriculture, Te Kuiti, gave a lecture on "Certification of Potato Seed" and "Home Growing of Potatoes."

Eastern Bay of Plenty

Edgecumbe.—Debate arranged with W.E.A. Report on Eastern Bay of Plenty district committee. Discussion on "Local Farm Schools."

Opotiki.—Field day on Mr. R. B. Gaskill's property. The members were shown over the farm by Mr. Gaskill.

Taneatua.—A club debate entitled "That Making of Ensilage for Fodder is More Profitable Than Growing Root Crops."

Waimana.—General business. Arrangements made for birthday of the club.

Western Bay of Plenty

Kati Kati.—General business, which included the election of Mr. M. Palmer as acting chairman to replace Mr. R. Walford, the former chairman, who left the district for military training. At the close of the meeting the club held a social evening.

Paengaroa.—Arrangements for club dance. Discussions on proposed Centennial Tree-planting Scheme. A talk on Maori customs was given by Mr. W. Black.

Tauriko.—General business. E. Fryeth, club member, gave an interesting cinematograph display.

Te Puke.—Mr. A. V. Allo, Department of Agriculture, gave an interesting lecture on "Cream Flavours and Their Control."

Waihi.—Lecture by Mr. A. V. Allo, Department of Agriculture, on "Lucerne Growing."

Waikato

Cambridge.—Dr. H. E. Annett gave an interesting address on "General Soil Deficiencies and Nutrition."

Huntly West.—Business meeting.

Tauhei.—Report on Auckland district committee meeting. Talk by F. Green on the Ruakura educational week.

Tahuna.—Discussion on subjects which arose at the district council meeting. Field day held on Mr. R. White's property, Tahuna. The demonstrations included a post mortem on a cow, conducted by Mr. MacIndoe, who also gave a lecture on "Pig Management." There was an attendance of 50, which included 30 members of the general public.

Te Awamutu.—Report on recent dance. An interesting address was given by Mr. J. S. Sheaf, Auckland Herd Testing Improvement Association, on "Herd Improvement." He dealt in particular with herd-testing, sire survey, and artificial insemination. A successful field day was held on the property of Mr. H. Allan, Kihi Kihi, the club being the guests of the Te Awamutu Jersey Club at their field demonstration. Mr. Lancaster, the demonstrator, outlined the qualities of the Jersey breed and spoke of the industry it maintains. The Jersey Club were thanked by the club chairman for their hospitality. There was an attendance of 64, including eight visiting club members and about 35 older farmers.

Hauraki.—Address by Mr. E. Edwards entitled "How to Conduct Meetings."

Auckland

Clevedon.—Report on club dance, showing a profit of £9 10s. Address by Dr. W. S. Hill, Otahuhu Technical High School, on "Classification and Uses of Grasses and Clovers." This was the first of a series of lectures on "Grassland Farming."

Harrisville.—Club debate held, "That Grassland Farming is Preferable to Partial Cropping." A field day held on the property of Mr. M. J. Barrett, Auckland. Mr. J. Armstrong demonstrated on "The Points to Observe When Selecting a Breeding Sow." Mr. Barrett's electric fence was also inspected.

Mauku.—Business meeting. Arrangements for club dance and field day.

Warkworth

Kaukapakapa.—Business meetings. Arrangements for field day. Address by Mr. K. A. Sneddon, "The Conduct of Meetings."

Whangarei

Keri Keri.—Discussion by members on "The Maintenance of a Bearing Lemon and Orange Orchard." The discussion embraced the cultural, picking, and breed control methods. At the previous meeting, Mr. H. S. Benner gave a lecture on accountancy.

Maungatapere.—Arrangements for club's annual ball. Mr. T. H. Hankin, Department of Agriculture, Whangarei, gave a very interesting lecture entitled "Diseases in Dairy Stock."

Dargaville

Arapohue.—Mr. E. B. Glanville, Department of Agriculture, showed the following agricultural sound films:—"Tour of New Zealand," "Benefits of Herd-testing," and "Reproduction among Mammals."

Marohemo.—A demonstration was given by Mr. E. B. Glanville, Department of Agriculture, of a portable sound projector, and several interesting films on agricultural subjects were shown.

Ruawai.—Sound films exhibited by Mr. E. B. Glanville, Department of Agriculture, on agricultural subjects.

Tangiteroria.—Arrangements for club dance. General discussion on various farm topics. A field day was held at Paradise, at which a demonstration and lecture on the care and shoeing of a horse's hoof was given. All club members later carried out the operation themselves for experience, and proved remarkably adept for beginners.

Health Notes for the Farm

Contributed by the Department of Health

Health Is Precious!

By Periodic Medical Examination Disease May Be Caught In The Early Stages

What a kaleidoscopic view the doctor has of human life! He is there at its arrival, he sees the whole stage of life and all the playing, and he is also behind the scenes. Puff himself up as he will with pride in his capacities and achievements, man has to realise that he takes his place in the animal creation, although at the top; and that fact governs his policy in the matter. Some are more animal than others, and therefore less susceptible to advice and less able to control themselves; and at best the result may only be a compromise. No rule will apply to all, but if the medical man be consulted and supplied with the facts of the case he will be able to give guiding counsel based on his medical knowledge.

Towards the close of life, too, the advice of the doctor is sought on general lines, but far too seldom, for if he were consulted more frequently by people passing into the sere and yellow leaf there would not be so many sudden deaths. The heart often gives warning not to its owner but to the examining doctor, whose advice in such circumstances is most valuable.

—DR. DAVID SCOTT,
"Getting Qualified."

WE have only to take up the daily newspaper to find recorded every week deaths of persons in the very prime of life and at the zenith of their careers—valuable lives that could ill be spared. Life abounds with such happenings. One method of the prevention of many such deaths lies in periodic physical examination by the family doctor at certain periods of life, and in the practice of personal hygiene after the particular needs of the individual are thus ascertained.

The secret of combating such maladies as cancer, kidney disease, heart trouble, diabetes, apoplexy, and other diseases is by early diagnosis. Therefore, periodic health examinations aiming at the early detection of disease have a very real place in the advancement of national stability. It is wise to take note of our own resources in meeting the daily happenings of life, and occasionally to take an inventory of our health habits and our physical and mental reactions to unusual situations.

Many who feel weak and futile could be strong and vibrant, unhampered by brain fatigue, nerve exhaustion, or undue bodily weariness if they gave some thought to the intelligent care of the body, paid reasonable attention to habits of living and thinking, and took a little time for proper correction or control of defects and impairments. Although many of those who have contributed greatly to the welfare of mankind have suffered poor health, yet it must be admitted that good health "permits one to live most and serve best."

School Children

The system of medical inspection of school children affords a striking illustration of the value of the early detection of physical deformities and disease. Every year thousands of children leave the public schools to start their life's work. During their school life many of these children have been found to suffer from visual defects, enlarged tonsils and adenoids, defects of hearing, goitre, and so forth. Failing their detection, care, and correction these common defects in children tend to produce permanent loss of faculty.

Twenty years ago there was no organised attempt to remedy this vast evil, and it is beyond question that, with occasional exceptions, the great bulk of these conditions were left unremedied. What has school medical inspection done for these children? It can be stated that the average child, on leaving school, is taller, heavier, and in better health than his predecessor 20 years ago. Any handicap due to defective vision or hearing has generally been remedied or abolished as far as medical skill can accomplish. He has learnt habits of cleanliness, and has in many instances been saved from the prolonged discomfort and loss or school attendance due to neglected inflammatory conditions of the eyes, ears, and skin.

Start in Childhood

In all these ways he leaves school substantially better equipped to fulfil the work and enjoy the pleasures of life. The school medical service represents strong evidence, if such is needed, of the supreme value of skilled medical examination of the human body exposed to the dangers of modern civilisation.

If we are failing to ensure the physical health of the normal child under 14 years of age we must not complain or be surprised if such neglect brings with it in later years a harvest of preventible incapacity of body and mind. Medical science and experience has proved with unmistakable clearness that disease and incapacity in adolescence and adult life find their source all too often in the seed time of childhood.

Similarly, later on in life there are periods in the majority of individuals when great benefits would be experienced from a thorough medical overhaul. Many diseases which cause deaths in middle years, and even later on, could be deferred, and what is known as good health maintained. If war demands medical examination of

recruits to ensure a high physical standard, surely in the everyday battle of life such means to ensure a healthy body is of equal importance. In many of our public hospitals a system of periodic medical examination is carried out, with most beneficial results to the nurses.

Breakdowns

Why do breakdowns come to some workers most needed in the world? Why are their plans suddenly shattered? The break comes because of unhealthy habits, unrecognised or ignored defects or impairments which strengthen their hold until one day there is a complete failure of the whole body to stand the strain. A good deal of this physical disorder does not appear as a sudden inexplicable catastrophe. Sometimes it comes because there is a belief that physical endurance has no limit.

There are individuals who seem to be able to violate every law of health, states one authority, and to have a good supply of energy, but the laws of Nature are immutable. The strongest physique in the world cannot undergo a continuous strain and make no provision for maintenance and repair of tissue and remain healthy. There may not be a breakdown, but there must be a disturbance, and perhaps disease.

Don't Be a Faddist

However, one should not be unduly and morbidly solicitous about one's health and drift ingloriously into the ranks of the extremists and faddists who are ridden by the health habit.

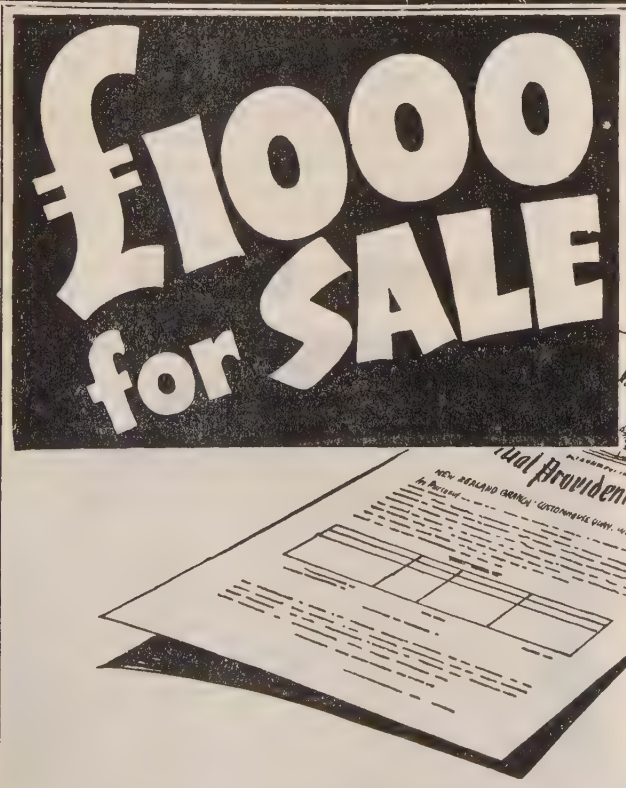
The self-examination of extreme faddists and their class, however, is not to be compared with an intelligent inventory of health assets and liabilities. An understanding of how best to control and direct the mind and the body gives a confidence and assurance that go far towards making the days satisfactory and tranquil.

Health, comfort, and happiness are, of course, sometimes the possessions of a lifetime without a health examination. Sometimes they are enhanced by following expert advice; often, their continuance depends on the correction of an impairment or a change in habits of living. However, enough has been indicated to stress the importance of a periodic medical examination of the human machine by the family doctor, more especially for the majority of us from the age of 40 upwards, when many diseases often have their onset.

For the protection of workers in what are known as dangerous trades such examinations are usually compulsory. It is realised from experience in these trades that prevention is better than cure, and the profound wisdom of this old maxim equally applies to all walks of life. In expectant motherhood periodic medical examinations are imperative to keep the door of health wide open to the mother and her babe.

Health Is Precious

Health is a precious thing, and among the manifold manifestations that may befall humanity the loss of health, particularly at the zenith of one's career, is one of the most severe. Health of the body and the mind is worth keeping, and there are periods of life when it is wise to consult our doctor and to co-operate with him in whatever can be done to restore health, to prevent illness, and to develop in all its fullness a normal and effective personality.



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The Farm Home and Kitchen

Contributed by the Association for Country Education

Brown Bread or White Bread

Brown bread or white bread? Still the controversy wages. What is your opinion? Read this article and see whether your views coincide with the conclusions reached by the Home Science School and the A.C.E.

TO hear some people talk, one would think that the sole reason for any physical deterioration in civilised man during the past century has been caused by his eating refined instead of wholegrain cereals. The poor housewife has been warned, on the one hand, that dire things are in store for her and her family unless she changes her family's eating habits as regards cereals, and, on the other hand, she has been told on good authority to take no notice of this advice, as it emanates from food faddists.

In this article it is proposed to put some of the facts before the housewife and so to enable her to form her own ideas of what adjustments might be desirable should she feel that the family diet requires improvement.

Two Main Objects

In the "wholemeal versus white flour" controversy it seems that there are two main questions involved:—

(a) Is there any difference in the nutritive value of wholemeal and white flour?

(b) Is the average New Zealand diet such that it would be better balanced and made more adequate in all respects if wholemeal were substituted for white flour?

It is proposed to deal with this in three sections, first of all by considering the wheat grain itself and the food products milled from it, then the

composition of these products, and lastly their food value as a part of the "average" New Zealand diet.

The Wheat Grain

The grain of wheat, so familiar to us all, is a much more complicated structure than its outward appearance would suggest.

The diagram on page 462 shows that from the outside inwards there is first of all the bran (a) consisting of several layers. Next to this is the aleurone layer (b) with its square cells. Inside this again is the endosperm, consisting of starch cells embedded in a fine network of protein. At one end of the grain is the embryo or germ (d).

Of the total weight of the grain, about 5 per cent. is bran, 8 per cent. aleurone layer, 5 per cent. germ, and 82 per cent. endosperm. As will be explained later, it depends on the milling process whether commercial bran contains only the bran proper and the germ, and more or less of the aleurone layer. White flour consists of most of the starchy endosperm of the original grain, with a varying amount of the aleurone layer, which is very rich in protein and phosphorus. Wholemeal flour as defined by the Pure Food Act "shall be the clean sound product of clean sound wheat, and shall contain all constituents of such wheat. . . . It must contain no added substance. Mixtures of flour and bran must not be sold as wholemeal flour."

"Part wholemeal" flour shall be as above, with "a portion of the bran and germ removed, but containing not less than 60 per cent. of the bran and germ."

"Wholemeal bread" shall be the product of wholemeal, and "brown bread" of "part-wholemeal flour," or of a mixture of wholemeal and white flour in the proportion of 60 per cent. wholemeal and 40 per cent. white.

All these points are specifically stated in the Act. However, as regards the weights of wholemeal loaves, there is no legal requirement, as they are classed as "fancy" breads and, as such, do not come under the regulations as they are at present constituted.

Milling the Grain

To convert wheat into flour by the roller-milling process the cleaned wheat is passed through a series of rollers. It first passes between corrugated rollers which flatten the grain and break out a little of the starchy kernel. This flour is called the "first break," and is sifted off from the unbroken wheat, which goes on through a second and more closely-set pair of rollers. This process continues, and at each break more flour is released, as the effect of passing through the rollers is to pulverise the inner floury part (endosperm), to flatten the bran and germ, and to break up the intermediate part or "middlings."

The flour is obtained by sifting. The bran, etc., is removed from the middlings by suction and other means, and the purified middlings are then ground into flour by passing through smooth rollers.

In large mills there may be as many as 40 or more streams of flour coming from the same lot of wheat as it goes through the mill. These flours have to be blended by the miller, as they are not of the same composition coming, as they do, from different parts of the wheat grain (endosperm and aleurone layer). The miller aims to produce not merely a well-milled flour, but one which is rich in the essential bread-making proteins "gliadin" and "glutelin."

"Gluten"

These two proteins between them make up "gluten," which gives dough the tenacity, elasticity, and strength that enables it to stretch when gas

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bubbles are formed in it, to hold these bubbles from escaping before cooking, and to keep the bread or other food from "falling" after it has been cooked. Without "glutelin" and "gliadin" in the flour in suitable proportions it would be impossible to have a light and spongy loaf, scone, or cake.

There are several other factors which are necessary if the flour is to produce the best loaf, and these the miller also has to regulate, not only by blending the different flours after the wheat has been milled, but by mixing different wheats which have different characteristics.

It will be evident that the miller must possess a great deal of expert scientific knowledge as well as elaborate machinery to produce for us the flour which will make the light, upstanding loaf which we have come to take for granted as our standard loaf.

This brief description of the milling process has been condensed from textbooks on the subject, but of necessity much interesting material has had to be left out. It is recommended, however, that anyone having the opportunity to do so should make a point of visiting and inspecting a flour mill in order to gain an appreciation of the miller's work.

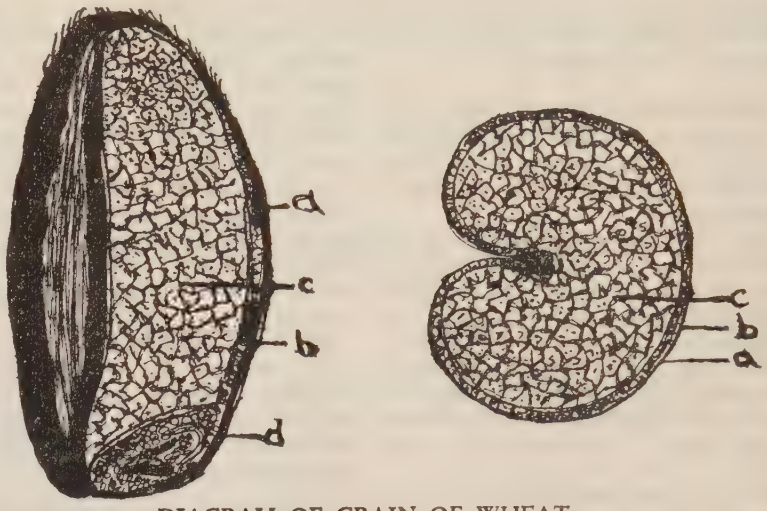

DIAGRAM OF GRAIN OF WHEAT.

Longitudinal and transverse sections. *a:* bran; *b:* aleurone layer; *c:* starch cells of endosperm; *d:* germ.

Nutritive Substances

The following is an analysis of average (hard) wheat products:—

Product.	Water	Protein	Carbohydrate	Fat	Minerals	Roughage
White flour ..	10.54	11.99	75.16	1.61	.5	.2
Bran	9.99	14.02	59.40	4.39	6.06	6.14
Wholemeal Flour	10.81	12.26	71.5	2.24	1.02	2.17
Germ	8.73	27.24	46.49	11.23	4.71	1.6

—(*Sherman's "Food Products."*)

It will be seen that there are more minerals, fat, and fibre or roughage in the bran, the germ, and the wholemeal flour than in the white flour.

The next question is whether these extra amounts of minerals, fat, and roughage make any difference to the nutritive value of the foods which are made from these four wheat products. From the point of view of nutritional value, lime, phosphorus, and iron are the three main minerals which have to be considered. The four vitamins A, B, C, and D (grouping B1 and B2 as B) have also to be taken into account, and the presence of roughage recorded as being of value in providing the bulk necessary for normal intestinal movements.

At the bottom of the page is an analysis of wholemeal and white bread showing comparison of nutrients.

To all but a nutritionist these actual weights are of little significance, except that they show that compared with white bread, wholemeal bread supplies nearly 1½ times as much lime, 2½ times as much phosphorus, and twice as much iron, and in addition it supplies two of the four vitamins in good quantities, and one vitamin (B) in very good quantities, whereas white bread contains only a negligible amount of all four vitamins.

Significance

All research into the average diets eaten in New Zealand homes shows that in general most families consume insufficient amounts of the lime-supplying foods, the best of which are milk and cheese. Most people secure phosphorus in ample amounts from the meat they consume, and the meat also supplies a fair amount of the Vitamin B and of iron. In these average diets butter and cream and eggs (yolks) supply a fair amount of Vitamin A and D, but roughage is often insufficient because of the comparatively low amount of fruit and vegetables in the diet.

In an accurate study of actual family menus made in the Nutrition Department at the Home Science School, analysis and estimations showed that:—

(1) All diets met the standards for energy and protein requirements.

(2) A high proportion of the total calories were derived from sugar and fats.

(3) The amounts of calcium, phosphorus and iron were low.

(4) It seems probable that the low calcium and phosphorus content of the diets, together with their high

	Quantity	Carbohyd. gms.	Protein gms.	Fat gms.	Lime gms.	Phosph. gms.	Iron gms.	Vitamins A.	B.	C.	D.
White bread ..	Slice 3½in. x 3½in. x 1½in.	16	3	.5	.009	.029	.0003	Negligible	Negligible	Negligible	Negligible
Wholemeal bread		15.5	2.5	.5	.015	.075	.0006	Good	Very good	Negligible	Good

—*Francis Stern, "Applied Dietetics."*

sugar content, may have a direct bearing on the poor teeth and high incidence of dental caries in New Zealand.

It was also pointed out that only one diet in 12 provided sufficient iodine without the use of iodised salt and other preparations. As regards the vitamins, with one exception all the diets could be considered to contain sufficient amounts of Vitamins A and D. The dietaries would appear to be adequate in B1, but, except for those where milk consumption is high, would possibly be low in B2.

Typical Diet

Going from the "average diet" to the quite typical diet, in some sections of the community where meat, tea, bread, scones, butter, and jam, or syrup, and other sweet and starchy foods make up the main items of the diet, a very pronounced shortage of lime, roughage, and vitamins is evident.

It is obvious that if the "average diet" calls for improvement, still more must these latter diets be improved all round by the increased use of milk, cheese, eggs, fruits, and vegetables. The question then arises whether the substitution of wholemeal flour for white flour and brown bread for white bread would also be necessary to bring them up to the ideal nutritive standard and to raise the "average" New Zealand diet to this standard.

On can merely quote the leading nutritional authorities of the world, who, in their report to the League of Nations setting out the optimum or ideally healthy diet, made the following statement under the heading "General Recommendations":—

"White flour in the process of milling is deprived of important nutritive elements. Its use should be decreased, and partial substitution by lightly-milled cereals, and especially by potatoes, is recommended."

Conclusion Reached

And now does the housewife know where she stands? Here is the conclusion that we of the Home Science School and A.C.E. have come to after considering all the facts. We feel that the situation boils down to this:—

If New Zealanders actually consumed all the milk, cheese, eggs, meat, and fruit and vegetables, both raw and cooked, that they needed for optimum nourishment it probably would not matter to any appreciable extent if they used refined rather than wholegrain cereals. But, as this unhappily is not the case, we think that they should try to increase their consumption of milk and cheese and fruit and vegetables as much as possible, and also, in order to provide a margin of safety, especially in regard to Vitamin B, they should aim at either:—

(a) Consuming a liberal serving of wholemeal or other whole-grain product twice daily (for example, wholegrain porridge or other whole-grain breakfast cereal, and wholemeal bread or scones or some such food as the sole or main starchy food at another meal); or (b) using as much wholemeal flour and bread as they do white flour and white bread.

Do you agree that this is a fair conclusion?

RECIPES

WHOLEMEAL FRUIT CAKE.

Butter, ½lb.
Wheatmeal, 12oz.
Fruit, 1lb.
Peel and nuts to taste.
Eggs (well beaten), 4.
Sugar, 10oz.
Cream of tartar, ¼ teaspoon.
Baking powder, ½ teaspoon.

Method.—Bake 1½ hours at 325-350 degrees F.

WHOLEMEAL SHORTBREAD.

Butter, ¼lb.
Sugar, 2½oz.
Egg, 1.
Wholemeal, ½lb.

Method.—Cream butter and sugar and add eggs and beat again. Add wholemeal and work well and roll on board. Bake at 400deg.F. for 15 minutes.

PARKIN.

Oatmeal, 1lb.
Flour, ½lb.
Syrup, 1lb.
Brown sugar, ¼lb.
Dripping, 6oz.
Soda, ½ teaspoonful.
Ginger, 1½ teaspoonfuls.
Nutmeg.
Warm water, 1 cup.

Method.—Melt fat and syrup, add dry ingredients, and stir well. (Add water or milk if too dry.) Pour into a greased tin. Bake in a cool oven two hours. One hour at low and one hour stored heat. Peel or sultanas may be added if desired. (These biscuits are hard and chewy.)

NUTTIES.

Brown sugar, ½lb.
Butter, ½ cup.
Rolled oats, 7oz.
Golden syrup, 1 tablespoonful.
Walnuts (chopped), ½ cup.
Salt, ½ teaspoonful.
Vanilla, ¼ teaspoonful.

Method.—Melt butter, add sugar, salt, syrup, vanilla, rolled oats, and nuts. Spread in flat tin and bake in oven 320deg. F. for three-quarters of an hour.

WHOLEMEAL GEMS.

Wholemeal, 1 cup.
Milk, 1 cup.
Butter, 2 tablespoons.
Baking powder, 5 teaspoons.
Flour, 1 cup.
Egg, 1.
Salt, 1 teaspoon.
Sugar, 2 tablespoons.

Method.—Sift white flour, baking powder, and salt and add to other dry ingredients. Then add eggs slightly beaten, milk, and melted butter. Bake in greased muffin tins or gem irons in moderate oven, 20-25 minutes.

OATMEAL GEMS.

Cooked porridge, 1 cup.
Milk, ½ cup.
Salt, ½ teaspoon.
Baking powder, 4 teaspoons.
Flour, 1½ cups.
Egg, 1.
Butter, 2 tablespoonfuls.
Sugar, 2 tablespoons.

Method.—Same as method for wholemeal gems.

BRAN GEMS.

Clean bran, 2 cups.
Baking powder, 3 teaspoons.
Eggs (beaten), 2.
Raisins (seeded), ¾ cup.
Salt, 1 teaspoon.
Flour, 1 cup.
Milk, 1½ cups.
Butter (melted), 1 tablespoon.
Sugar, ½ cup.

Method.—Same method as for wholemeal gems.

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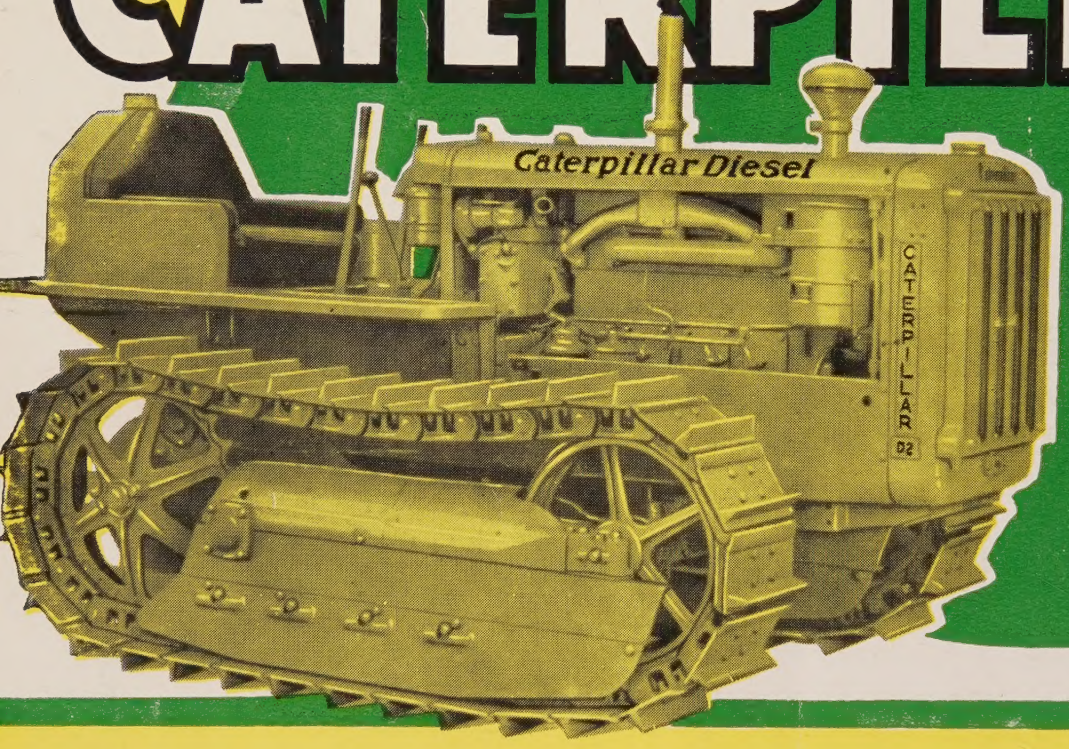

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